

AGRICULTURE & INDUSTRY

in South-Eastern Roman Britain



EDITED BY DAVID BIRD

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Contents

Cover

Title Page

Copyright

Contents

List of Figures

List of Tables

Contributors

Editor's Foreword

Chapter 1: Introduction: Population and the Dynamics of Change in Roman South-Eastern England

Chapter 2: The Environment of Southern Roman Britain

Chapter 3: The Countryside of the South-East in the Roman Period

Chapter 4: Kent Roman Rural Settlement

Chapter 5: Rural Settlement in Roman Sussex

Chapter 6: Rural Settlement in Roman-Period Surrey

Chapter 7: Market Forces - A Discussion of Crop Husbandry, Horticulture and Trade in Plant Resources in Southern England

Chapter 8: Querns and Millstones in Late Iron Age and Roman London and South-East England

Chapter 9: The Exploitation of Animals and Their Contribution to Urban Food Supply in Roman Southern England

Chapter 10: The Roman Salt Industry in South-Eastern Britain

Chapter 11: Leatherworking in South-Eastern Britain in the Roman Period

Chapter 12: Working Skeletal Materials in South-Eastern Roman Britain

Chapter 13: The Development of Iron Production in the Roman Weald

Chapter 14: Ironwork and Its Production

Chapter 15: Roman Non-Ferrous Metalworking in Southern Britain

Chapter 16: Clay, Water, Fuel: An Overview of Pottery Production in and Around Early Roman London

Chapter 17: The Supply of Tile to Roman London

Guide

Cover	
Title Page	
Copyright	
Contents	
List of Figures	
List of Tables	
Contributors	
Editor's Foreword	
Chapter 1: Introduction: Population and the Dynamics of Change in Roman South-Eastern England	
Chapter 2: The Environment of Southern Roman Britain	
Chapter 3: The Countryside of the South-East in the Roman Period	
Chapter 4: Kent Roman Rural Settlement	
Chapter 5: Rural Settlement in Roman Sussex	
Chapter 6: Rural Settlement in Roman-Period Surrey	
Chapter 7: Market Forces - A Discussion of Crop Husbandry, Horticulture and Trade in Plant Resources in Southern England	
Chapter 8: Querns and Millstones in Late Iron Age and Roman London and South-East England	
Chapter 9: The Exploitation of Animals and Their Contribution to Urban Food Supply in Roman Southern England	
Chapter 10: The Roman Salt Industry in South-Eastern Britain	
Chapter 11: Leatherworking in South-Eastern Britain in the Roman Period	
Chapter 12: Working Skeletal Materials in South-Eastern Roman Britain	
Chapter 13: The Development of Iron Production in the Roman Weald	
Chapter 14: Ironwork and Its Production	
Chapter 15: Roman Non-Ferrous Metalworking in Southern Britain	
Chapter 16: Clay, Water, Fuel: An Overview of Pottery Production in and Around Early Roman London	
Chapter 17: The Supply of Tile to Roman London	

Pagebreaks of the print version

ii
iii
iv
v
vi
vii
viii
ix
x
xi
xii
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23

24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57

58
59
60
61
62
63
64
65
66
67
68
69
70
71
72
73
74
75
76
77
78
79
80
81
82
83
84
85
86
87
88
89
90
91

92
93
94
95
96
97
98
99
100
101
102
103
104
105
106
107
108
109
110
111
112
113
114
115
116
117
118
119
120
121
122
123
124
125

126

127

128

129

130

131

132

133

134

135

136

137

138

139

140

141

142

143

144

145

146

147

148

149

150

151

152

153

154

155

156

157

158

159

160
161
162
163
164
165
166
167
168
169
170
171
172
173
174
175
176
177
178
179
180
181
182
183
184
185
186
187
188
189
190
191
192
193

194
195
196
197
198
199
200
201
202
203
204
205
206
207
208
209
210
211
212
213
214
215
216
217
218
219
220
221
222
223
224
225
226
227

228

229

230

231

232

233

234

235

236

237

238

239

240

241

242

243

244

245

246

247

248

249

250

251

252

253

254

255

256

257

258

259

260

261

262
263
264
265
266
267
268
269
270
271
272
273
274
275
276
277
278
279
280
281
282
283
284
285
286
287
288
289
290
291
292
293
294
295

296

297

298

299

300

301

302

303

304

305

306

307

308

309

310

311

312

313

314

315

316

317

318

319

320

321

322

323

324

325

326

327

328

329

330

331

332

333

334

335

336

337

338

339

340

341

342

343

344

345

346

347

348

349

350

351

352

353

354

355

356

357

358

359

360

361

362

363

364

365

366

367

368

369

370

371

372

373

374

375

376

377

378

379

380

381

382

383

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Front cover: Stylised 'mosaic' of agricultural and industrial activity based mostly on representations from the 2nd and 3rd centuries in the north-western Roman provinces. Illustration by Lyn Spencer.

Contents

List of Figures

List of Tables

Contributors

Editor's Foreword

1. Introduction: Population and the Dynamics of Change in Roman South-Eastern England

Michael Fulford and Martyn Allen

2. The Environment of Southern Roman Britain

Petra Dark

3. The Countryside of the South-East in the Roman Period

David Bird

4. Kent Roman Rural Settlement

Paul Booth

5. Rural Settlement in Roman Sussex

David Rudling

6. Rural Settlement in Roman-Period Surrey

David Bird

7. Market Forces - A Discussion of Crop Husbandry, Horticulture and Trade in Plant Resources in Southern England

Gill Campbell

8. Querns and Millstones in Late Iron Age and Roman London and South-East England

Chris Green

9. The Exploitation of Animals and Their Contribution to Urban Food Supply in Roman Southern England

Mark Maltby

10. The Roman Salt Industry in South-Eastern Britain

Edward Biddulph

11. Leatherworking in South-Eastern Britain in the Roman Period

Jackie Keily and Quita Mould

12. Working Skeletal Materials in South-Eastern Roman Britain

Nina Crummy

13. The Development of Iron Production in the Roman Weald

Jeremy Hodgkinson

14. Ironwork and Its Production

Ian Scott

15. Roman Non-Ferrous Metalworking in Southern Britain

Justine Bayley

16. Clay, Water, Fuel: An Overview of Pottery Production in and Around Early Roman London

Louise Rayner

17. The Supply of Tile to Roman London

Ian M. Betts

List of Figures

Editor's foreword: Edward Walker.

- Fig. 1.1: Graphs showing proportional change in Roman rural settlements over time across Greater London, Kent, Surrey and Sussex between the 1st century BC and the late 4th century AD.
- Fig. 1.2: Distribution of rural settlements, including villas, in relation to geology across Greater London, Kent, Surrey and Sussex between the late 1st century BC and the mid-1st century AD.
- Fig. 1.3: Distribution of rural settlements, including villas, in relation to geology across Greater London, Kent, Surrey and Sussex between the mid-1st century and the end of the 2nd century.
- Fig. 1.4: Distribution of rural settlements, including villas, in relation to geology across Greater London, Kent, Surrey and Sussex in the 3rd century.
- Fig. 1.5: Distribution of rural settlements, including villas, in relation to geology across Greater London, Kent, Surrey and Sussex in the 4th century.
- Fig. 2.1: Summary pollen percentage diagram from Sidlings Copse, Oxfordshire, showing the estimated position of the Roman-period part of the sequence.
- Fig. 2.2: Ancient beech pollards near Lodge Road Bog, Epping Forest.
- Fig. 2.3: Summary pollen percentage diagram from Lodge Road Bog, Epping Forest, Essex, showing the estimated position of the Roman-period deposits.

Fig. 3.1:	Ashtead Roman villa room 6; excavation in progress 1926.
Fig. 3.2:	Comparison of overall settlement in the Roman period and nucleated settlement in the 19th century.
Fig. 3.3:	Topography and woodland south of the North Downs. A view from Ranmore Common, Surrey.
Fig. 3.4:	View of the stokehole end of a large tile kiln near Reigate, showing the worked stone blocks, probably seconds from a nearby quarry.
Fig. 3.5:	Cocks Farm, Abinger: polished Paludina limestone slab probably from the villa bath-house.
Fig. 4.1:	The distribution of sites recorded for the Roman Rural Settlement Project: a partial reflection of relative densities of settlement in Kent.
Fig. 4.2:	Chronology (based on pottery) of sites along the line of HS1 Section 1 in Kent.
Fig. 5.1:	Distribution map of various Roman-period sites in Sussex.
Fig. 5.2:	Comparative plans of the Flavian palace at Fishbourne and the contemporary Period 1 'mini-palace' at Southwick.
Fig. 5.3:	Plan of field systems, trackways and settlement sites on Bullock Down (Beachy Head).
Fig. 5.4:	Bullock Down Site 44. Large corn-drying oven viewed from the stoke-hole.
Fig. 5.5:	Barcombe villa. Artist's impression of the villa c. AD 250 with the winged-corridor house and aisled building.
Fig. 5.6:	Bignor villa. A revised plan of the villa.
Fig. 6.1:	Surrey: geology and the location of major places mentioned in the text.

Fig. 6.2:	Chiddingfold: late Iron Age enclosures identified by geophysical survey and selective excavation with the likely position of the buildings recorded in the later 19th century superimposed.
Fig. 6.3:	Enclosures at Hengrove Farm, Staines and Wey Manor Farm.
Fig. 6.4:	Thorpe Lea Nurseries, Iron Age and Roman features.
Fig. 6.5:	Simplified plans of selected enclosures.
Fig. 6.6:	Simplified plan of enclosures at Runfold.
Fig. 6.7:	Barnwood School, Guildford: detail of villa estate building with associated enclosure and earlier aisled structure.
Fig. 6.8:	Farleigh Court. Simplified plan of enclosure and corn-drying oven.
Fig. 7.1:	Complete spelt wheat spikelet from a late Roman corn-drying oven.
Fig. 7.2:	Hay meadow in flower, Cherwell meadows, Oxford.
Fig. 7.3:	Fennel, a Roman escape from cultivation, growing on the south coast.
Fig. 7.4:	Young Stone Pines bearing nut-producing cones on Southsea seafront, suggesting that cultivation in the Roman period would have been viable.
Fig. 8.1:	Simplified solid geology of South-East England, with the location of quern and millstone industries, and places mentioned in the text.
Fig. 8.2:	Distant and overseas sources of supply mentioned in the text.
Fig. 8.3:	Late Iron Age querns of Ragstone and Folkestone greensand.
Fig. 8.4:	Rotary querns and a mortar in Folkestone greensand.
Fig. 8.5:	Millstones in Folkestone greensand.

Fig. 8.6:	Lodsworth greensand querns.
Fig. 8.7:	French <i>Poudingue</i> querns and Hertfordshire Puddingstone quern.
Fig. 8.8:	Worms Heath Puddingstone querns.
Fig. 8.9:	Mayen lava querns and millstones.
Fig. 8.10:	Querns/millstones from Vauxrezis and Reculver.
Fig. 9.1:	Percentage of cattle of total cattle, sheep/goat and pig (over time).
Fig. 9.2:	Percentage of cattle of total cattle, sheep/goat and pig (over urban space).
Fig. 9.3:	Sheep/goat, distal tibia breadth measurements, Colchester AD 44–60/1.
Fig. 9.4:	Sheep/goat, distal tibia breadth measurements, Colchester AD 60–125.
Fig. 9.5:	Sheep/goat, distal tibia breadth measurements, Colchester AD 60–300.
Fig. 9.6:	Sheep/goat, distal tibia breadth measurements, Colchester AD 225–400.
Fig. 9.7:	Sheep/goat, distal tibia breadth measurements, Exeter AD 50–400.
Fig. 10.1:	Map showing salt-related sites in Kent and Sussex.
Fig. 10.2:	Plan of salt-production features at Broomhey Farm, Kent.
Fig. 10.3:	Plan of salt-production features at Chidham, Sussex.
Fig. 10.4:	Map showing areas of salt-making in Essex.
Fig. 10.5:	Plan of salterns in Area A, Stanford Wharf Nature Reserve, Essex.
Fig. 10.6:	Late Roman briquetage from Stanford Wharf Nature Reserve, Essex.
Fig. 10.7:	Early Roman lid-seated jars.
Fig. 11.1:	A map of Roman London showing the major sites with finds of leather mentioned in the text.

Fig. 11.2:	Replica Roman military equipment.
Fig. 11.3:	Shoemaking waste from excavations at 60 London Wall.
Fig. 11.4:	Iron half-moon knife from London.
Fig. 11.5:	Iron awls with leather handles from London.
Fig. 11.6:	Leather one-piece shoe from Kitchenham Farm, Ashburnham, Hastings.
Fig. 12.1:	Bone objects.
Fig. 12.2:	Antler objects.
Fig. 12.3:	Bone-working waste from Winchester.
Fig. 12.4:	Bone-working waste from Colchester.
Fig. 12.5:	Bone and antler objects and waste from Lullingstone villa.
Fig. 12.6:	Bone-working waste from the Marlowe Car Park site, Canterbury.
Fig. 13.1:	Pre-Roman ironworking sites in the Weald; named sites are mentioned in the text.
Fig. 13.2:	Remains of a 1st-century Roman bloomery furnace; Little Furnace Wood, Mayfield.
Fig. 13.3:	Diagrammatic cross section of a typical Wealden bloomery site.
Fig. 13.4:	Scaled comparison of four major Roman iron sites.
Fig. 13.5:	Major Roman iron sites in the Weald with sites of <i>Classis Britannica</i> tiles.
Fig. 13.6:	Detail of a <i>Classis Britannica</i> stamped tile from Beauport Park.
Fig. 13.7:	Reconstruction of the bath-house, Beauport Park.
Fig. 13.8:	The area around Bardown ironworking site, near Wadhurst.
Fig. 13.9:	The area around Great Cansiron ironworking site, near Hartfield.
Fig. 14.1:	Smithing, leatherworking and carpentry tools.
Fig. 14.2:	Carpentry and agricultural tools.

Fig. 14.3:	Agricultural and butchery tools.
Fig. 15.1:	The metalworking cycle.
Fig. 15.2:	Crucibles.
Fig. 15.3:	Names used for copper alloys.
Fig. 15.4:	Brass-making crucibles from Colchester, Canterbury and London.
Fig. 15.5:	Early Roman parting vessels from London, Exeter and Chichester.
Fig. 15.6:	Reconstruction of one of the Verulamium workshops.
Fig. 16.1:	Location of key sites.
Fig. 16.2:	Selection of early Alice Holt/ Surrey vessels found in London.
Fig. 16.3:	Plan of excavations at Highgate Wood.
Fig. 16.4:	Selection of vessels produced at Highgate Wood.
Fig. 16.5:	Highgate Wood kiln 5.
Fig. 16.6:	Selection of vessels in Sugar Loaf Court ware.
Fig. 16.7:	Selection of vessels from 60–63 Fenchurch Street.
Fig. 17.1:	Location of sites in London with wasters from tile production.
Fig. 17.2:	Civilian tile stamp from Cloak Lane, London.
Fig. 17.3:	Distribution of the yellow, cream, white and pink tiles believed to have been made in the Eccles area.
Fig. 17.4:	Distribution of north Kent red tiles in fabric 3226.
Fig. 17.5:	Distribution of tiles believed to have been made by Sussex tilemakers.
Fig. 17.6:	Voussoir tile believed to have been made by the Sussex tilemakers.
Fig. 17.7:	Large relief-patterned curved brick from Bloomberg, London.
Fig. 17.8:	Distribution of sandy and silty tiles in fabric 3069.
Fig. 17.9:	Distribution of calcareous tiles.
Fig. 17.10:	Distribution of <i>Classis Britannica</i> stamped tiles, with inset showing

Fig. 17.11:

distribution in London.
Distribution of shelly tiles from
Harrold, Bedfordshire.

List of Tables

Table 9.1:	Domestic mammal bones recovered from major Roman towns in southern England.
Table 9.2:	Percentages of cattle in early and late urban Romano-British assemblages (from sites in Table 9.1).
Table 9.3:	Percentages of cattle from sites in different parts of towns (all periods combined).
Table 9.4:	Percentages of sheep/goat of total sheep/goat and pig in early and late urban Romano-British assemblages.
Table 11.1:	Summary of leather finds from sites in south-eastern England known to the authors.
Table 12.1:	Evidence for working skeletal materials in southern Britain.
Table 12.2:	Artefact-types present on sites in the region.
Table 14.1:	Evidence for tools, agricultural tools and metalworking.
Table 14.2:	Numbers of tools and agricultural tools by site type.

Contributors

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Editor's Foreword

David Bird

This book offers an up-to-date assessment of our knowledge of rural settlement, agriculture and industry in and around the three counties to the south of Roman London. It had its origins in a series of conferences set up by the Roman Studies Group of Surrey Archaeological Society, one of several active groups and committees in that Society. The Group was established in 2004, since when it has been responsible for a successful fieldwork programme that has added a great deal to our knowledge of Surrey in the Roman period.

The biennial conferences were initiated by Edward Walker, starting with the subject of water in southern Roman Britain in 2008. Thanks to Edward's hard work and persistence, the event was a great success and set a high standard of well-qualified speakers, which has been continued in subsequent meetings. Two of these conferences, also organised by Edward, tackled the themes first of food and agriculture, and then industry. It was felt appropriate to publish the proceedings and the talks given at these two meetings form the core of this book. Additional specialist papers were commissioned to tackle subjects not covered in the original programmes.

The merest glance at countrywide distributions of Roman rural settlement (e.g. Taylor 2007, 24, fig. 4.1, 34, fig. 4.9) shows how at this scale the broad sweep of British geology is instantly apparent. It should be abundantly clear that Britain has regions that are essentially the result of the underlying geology and other factors such as climate. Yet this is not always seen as an important contributor to the recognisably different communities in Roman Britain which are becoming more obvious through recent studies of the distribution of categories of finds (see e.g. Crummy and Eckardt 2003 and other papers mentioned therein).

The aim of the conferences has always been to focus where possible on the South-East, by which is meant here especially the ancient counties of Kent, Surrey and Sussex (nowadays split into East and West Sussex), the counties surrounding the Weald. They have a strongly marked character of their own that has survived remarkably well in the face of ever-increasing population pressure. Nevertheless, the region is of course not isolated and there are strong links into

nearby counties, including across the Thames estuary and indeed much further by sea. The nature of the subsoils and other factors often affects the survival of environmental evidence in the region and therefore some of our papers have also had to range more widely to aid discussion.

Following an introduction derived from the results of the Roman Rural Settlement Project, then an overview of the environment and a consideration of themes relevant to the South-East as a whole, fourteen separate papers cover the topics of rural settlement in each county, crops, querns and millstones, animal exploitation, salt production, leatherworking, the working of bone and similar materials, the production of iron and of iron objects, non-ferrous metalworking, pottery production and the supply of tile to Roman London. The interdependence of agriculture and industry is obvious in many of the contributions, for example the iron tools needed to work the land, or the animal products required as the raw material for bone and leatherworking.

The South-East, as defined above, tends to be comparatively neglected in discussion of Roman Britain, where it is often subsumed into a generalised treatment of the 'civilian' part of Britannia that is based largely on other parts of the country. This book therefore aims to redress the balance.



Edward Walker taking a well-earned break during a conference at the Chertsey Hall. Photograph: David Calow.

Acknowledgements

Thanks should first go to Edward Walker and his band of willing helpers from the Surrey Roman Studies Group. This book is in many ways their creation. Edward is a modest man and it is therefore pleasing that after the most recent conference he found himself at a meeting where his neighbour happened to mention that he had been at a Surrey Archaeological Society conference very recently. He explained the title of the conference and asked if Edward was aware of it. When Edward admitted that he was and had in fact organised it, the man insisted on pumping his hand vigorously and telling him that the event got ten out of ten on every point that he looked for in a conference. A well-earned tribute.

The cover illustration arose from ideas suggested in discussion at a coffee break on the Group's Abinger excavation. These ideas were then worked up by Lyn Spencer and are loosely based on illustrative material mostly of the 2nd and 3rd centuries from the north-western provinces. It is of course not intended to be taken seriously but is simply meant to be evocative of the Roman period and of the subjects in the book.

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Chapter 1

Introduction: Population and the Dynamics of Change in Roman South-Eastern England

Michael Fulford and Martyn Allen

Roman Britain stands out in a variety of ways from the Britain of the immediately preceding centuries and from the Britain of the succeeding centuries. The most celebrated and the most obvious distinguishing features are the military and urban centres and the roads which linked them together, the rural architecture of the countryside exemplified by buildings in masonry such as villas and temples, and the rich and voluminous material culture consumed by the various populations. A variety of agencies drove these changes: on the one hand, military and civil administrations imposing new structures for the province as a whole, on the other, competition among local elites using their (largely) landed wealth to take advantage of the opportunities that new concepts and technologies in building and manufacturing gave them to provide state-of-the-art public and private buildings in town and country and to produce consumer goods for the wider population.

Underpinning all these changes was the capacity to produce sufficient food to provide the surplus to support them and to feed those whose priorities were not food production, notably the occupying army of the province. Food production, especially of grain, but also of meat, with its important secondary products of leather and wool, was the principal occupation of the population of Roman Britain, just as it was for the pre-Roman population and it remained a labour-intensive activity even if yields might have improved through the adoption of manuring practices and of improved technologies in ploughing and harvesting. The capacity to sustain 'Roman Britain' ultimately depended on maintaining its population, its agricultural productivity and the ability to distribute the surplus; changes in population numbers, whether up or down, could have both local and provincial-wide impact on productivity.

Since the themes of this book are agriculture and industry, the latter very much dependent on the former, it seems appropriate to review the evidence for population and population change in the

South-East between the late Iron Age of the 1st century BC/early 1st century AD and the 5th century and to relate it to major changes observable in the archaeological record in the region.

Our first insights into Britain's population come from ancient, written sources; not precise census information but some direct and indirect comments from historians. From the mid-1st century BC Caesar, for example, remarks on the settlement of coastal regions of Britain by immigrants from Belgic territories, noting that they were called after the tribes from which they originated (*De Bello Gallico* 5, 12). In the same chapter he also noted that the population was very large and their homesteads numerous. Writing towards the end of the 1st century BC Strabo comments that the expected tax return from conquering Britain would be matched by the costs of an army of conquest and occupation comprising perhaps one legion and some cavalry (4, 5, 3). The anticipated tax revenue was, presumably, directly related to the size of the population. In another passage he commented that more revenue was gained from dues on trade than might be expected as tribute gained through conquest (2, 5, 8). Strabo also noted that slaves were among the exports from Britain (4, 5, 2). Even without actual numbers, these two sources indicate both inward and outward flows of people before the Claudian invasion and an overall size of population not consistent with the production of great surpluses. We do not know what information Strabo drew on as the basis for his comment on likely tax revenues, but it suggests that planners and decision makers were not expecting an agricultural return comparable to that derived from, say, the Mediterranean provinces of Africa and Egypt. Indeed, with Tacitus' celebrated rhetorical remark that gold and silver were the reward of victory (*Agricola* 12, 15), the emphasis is on the anticipated return from mineral exploitation. Citations of actual numbers are those given in relation to rebellion and great battles, most notably the numbers associated with the Boudican revolt of AD 60/1: those slain in the three cities of Colchester, London and Verulamium, amounting to some 70 to 80,000 (Tacitus, *Annals* 14, 33; Dio Cassius, *Roman History (Epitome)* 62, 1), while the number said to have fought on the side of Boudica at the final battle which quashed the revolt amounted to some 230,000 with the number killed by Rome put at 80,000 (Dio Cassius 62, 8; Tacitus *Annals* 14, 37). Aggrandising, as they do, the magnitude of the final Roman victory, these very large numbers are not to be taken literally. However, we are on slightly more reliable ground if we count the numbers serving in the Roman army in Britain

in so far as we are quite confident of the sizes (at full strength) of the different units which made up the army of legionaries and auxiliaries. Yet, even if we might be reasonably certain of the numbers of legions present in Britain at any one time, it is a different story for the number of auxiliary regiments where we look to the evidence of *diplomata* and other epigraphic sources for enlightenment on the number at any one time and the changes over time. A thread common to both legions and auxiliary regiments is a prevailing uncertainty about the strength of individual units at a particular time or, indeed, over time. Nevertheless, estimates for the size of the garrison of Britain and its changes over time probably provide the most reliable figures for the province as a whole, at least, perhaps, until the 3rd century.

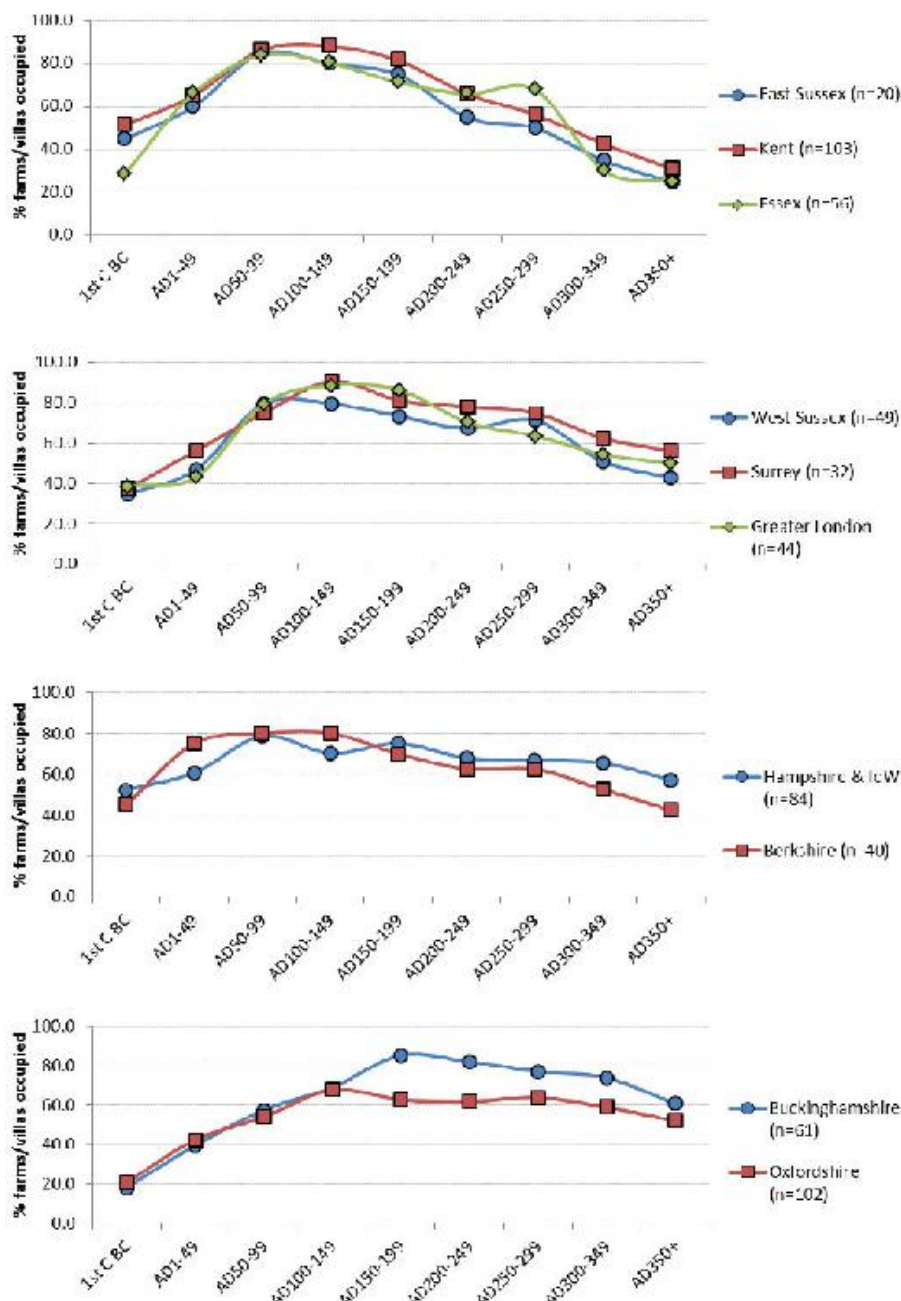


Fig. 1.1: Graphs showing proportional change in Roman rural settlements over time across Greater London, Kent, Surrey and Sussex between the 1st century BC and the late 4th century AD.

Is it right, then, to assume a net inflow, represented by the Roman army, numbering perhaps some 40,000, into Britain in AD 43 and the years immediately following? We have, after all, also to factor in an unknown number of camp followers, those that supplied the army

with its materials, its subsistence and its luxuries. The foundation of London owed its existence completely to the merchants profiting from the war of conquest (Tacitus *Annals* 14, 33). Veterans who chose to stay behind to found colonies like Colchester in AD 49 also added to the complement of incomers. But, though we do not have their numbers, there was also, presumably, a continual outflow of slaves resulting from the ongoing war of conquest. The rapid annexation of the South-East and its apparent light and short-lived military occupation might have spared this part of Britain, but, from the late 40s onwards, the campaigns to the south-west, Wales and the north surely led to a continual, year-on-year, export of slaves across the Channel, though a proportion would have remained, re-settled in a rapidly growing London, the new colonies and in the South-East more generally, as a variety of epigraphic sources attest. So, for at least the second half of the 1st century AD, we should perhaps be neutral as to whether or not the army and its followers amounted to a net inflow into Britain. As the conquest moved further north and the frontier of the province hardened along the line of Hadrian's Wall in the early 2nd century, the source of slaves would also have shifted in parallel. The north of Britain presumably remained a potential source of slaves as long as campaigning continued beyond the frontier. However, whether or not the acquisition and sale of slaves from the peripheral areas within the province ever ceased altogether, remains unknown.

It is against this background of uncertainties that historians of Roman Britain have tried to estimate population, reaching a broad consensus by the late 20th century and arguing for a large population for the province, larger than that for the England of the later medieval period (only some 2.8 million in the mid-16th century (Wrigley and Schofield 1981)). Over the last 40–50 years the lowest estimate for Roman Britain has been 2 million (Frere 1999, 302–4), the highest 5–6 million (Smith 1977; Salway 1981, 542–52). Frere checked his figures for urban populations against estimates for the population of towns in the later medieval period, as well as comparing his overall figure for Britain with that for England and Wales at the time of Domesday (approx. 1.75–2.25 million) (1999, 256–8; 302–4). The most considered modern estimate incorporating baseline data from three local authority SMRs and 14 rural archaeological surveys is Millett's (1990, 181–6), which arrived at a figure of 3,665,000 for the first half of the 4th century. To arrive at his urban population figures Millett drew on Hassan's (1981) data for pre-industrial, Middle Eastern towns and, for the rural population, he extrapolated from the

survey evidence on the assumption of a consistent level of population across the areas of grassland, arable and urban areas in England and Wales calculated by Edwards and Wibberley (1971), only excluding 'the least suitable land' (1990, 183). More recently, Mattingly has suggested a total population of Roman Britain of some two million. This is based on an estimate of about 200,000 for the total urban and military populations respectively and an assumption that these represented about 20 per cent of the total population (Mattingly 2006, 356).

With insufficient refinement of the evidence to compare early with late Roman, all these figures certainly stand for the 3rd–4th centuries, if not the 2nd to 4th centuries. The paradox, however, is how little changes in the character of urban and rural *Britannia* between the 2nd and the 4th centuries. No new towns, characterised by a complement of public buildings, emerge after the mid-2nd century, and, using the size of the defended area as a proxy, there is little or no evidence of a change in population size between the end of the 2nd century, when towns were defended by earthen ramparts and ditches, and the end of the 3rd century when those defences were replaced by masonry walls to enclose exactly the same areas. Along with the contemporaneous construction of the coastal forts around the shores of south and east Britain, the latter appear to represent the last significant phase of public building in the province. For the 4th century it is the aggrandisement of private dwellings, mostly in the countryside, but also in some towns, especially in the south-west, which is conspicuous in the archaeological record. For the most part these developments were incremental, representing development of pre-existing structures; few were *de novo* constructs. So how is it that a population which had the capacity to do so much by the mid-to-late 2nd century achieved so little in the way of building projects in the later Roman period? Several questions immediately arise, most obviously, have we estimated population and population change correctly? However, we also need to remember the imperial context: Britain was part of a large empire, where the state had the power to redirect surpluses away from the provinces which produced them, and here we think particularly of the supply of corn from Africa and Egypt to feed the population of Rome. In the case of Britain there is written evidence for the export of corn to cities in the Rhineland during the reign of the Emperor Julian in the mid-4th century (Libanius *Oratio* 18, 82–3; Zosimus 3, 5, 2). Equally, individuals could own land in any province and distribute surpluses from one province to anywhere they chose; a

great villa such as Piazza Armerina in Sicily could have drawn on surpluses from estates across the empire.

Whereas in the past estimates for the countryside have been based on survey data (e.g. Millett 1990, 184, table 8.3), for the most part comprising sherd and ceramic building material scatters recovered from the ploughsoil, it is now possible to consider the cumulative evidence of *excavated* evidence from the countryside which also introduces a more refined chronological dimension to the analysis. With the volume of site data now available, it is possible to use settlements as a proxy for estimated population numbers and to consider variability between regions within Britain. Since 2012 the Leverhulme- and English Heritage-funded Roman Rural Settlement project, based at the Universities of Reading and York and at Cotswold Archaeology, has been drawing together data from excavated settlements of which the great majority in all regions have been excavated since the implementation of PPG 16 in 1990. The project has embraced data from sites excavated both before and after 1990 and included both published and unpublished 'grey literature' reports. The project is taking account of all types of rural settlement evidence between the late Iron Age (1st century BC) and the early 5th century AD and includes all excavations producing sufficient evidence of plan and/or contextualised finds to characterise the site in question. It is not comprehensive of all excavations; it does not include every evaluation and watching brief or HER record of Roman finds at a particular location. At the time of writing the project has completed data capture from 3500 reports relating to some 2400 settlements from all English (modern) regions and summary results have been presented at seven regional seminars.

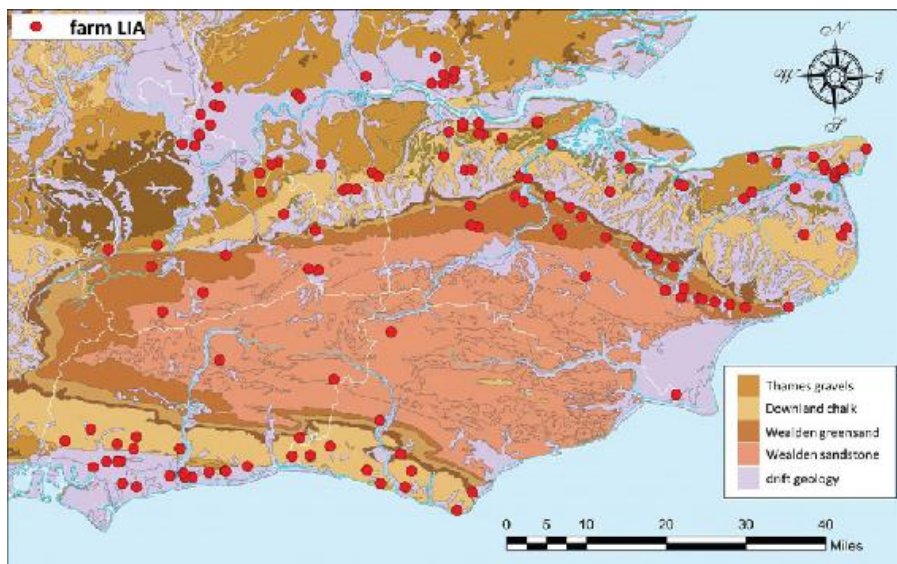


Fig. 1.2: Distribution of rural settlements, including villas, in relation to geology across Greater London, Kent, Surrey and Sussex between the late 1st century BC and the mid-1st century AD.

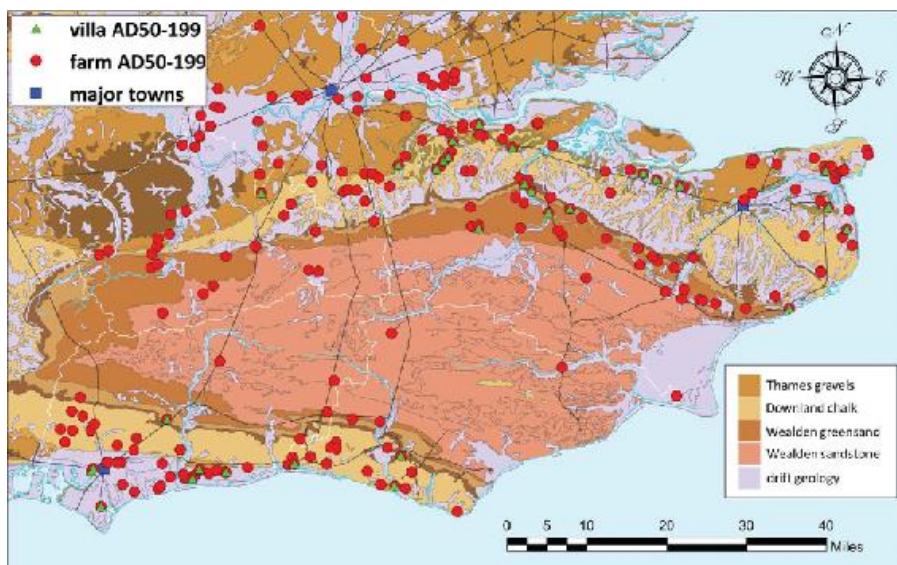


Fig. 1.3: Distribution of rural settlements, including villas, in relation to geology across Greater London, Kent, Surrey and Sussex between the mid-1st century and the end of the 2nd century.

All these regions in England show a marked increase in settlement numbers from the late Iron Age reaching a peak by the mid- or later 2nd century. Within less than 200 years, settlement numbers increase by an order of magnitude of over 100 per cent. At the same time, given the numbers of settlements in the project database, it is now

possible to begin to explore the data on a sub-(modern) regional basis. In this case we can consider the pattern of settlement dynamics in Greater London, Kent, Surrey and East and West Sussex, but also set it in a slightly wider context embracing the neighbouring counties of Berkshire, Buckinghamshire, Essex, Hampshire and Isle of Wight and Oxfordshire (Fig. 1.1). In this regional study we take account of all rural farming settlements with excavated evidence, including villas, but excluding nucleated sites. For the eastern counties of Kent and East Sussex settlements more than double their numbers between the 1st century BC and the end of the 1st/early 2nd century AD, with only slight, further increase to the mid-2nd century AD, when numbers reach their peak. North of the Thames in Essex the increase is of the order of more than 200 per cent by the mid-2nd century. For the neighbouring south-eastern counties of Surrey, West Sussex and Greater London the increase is comparable with a slightly greater than 100 per cent increase for Greater London and Surrey between the 1st century BC and the mid-2nd century, when numbers also peak. While Buckinghamshire does not peak till the second half of the 2nd century with a 200 per cent increase on its 1st-century BC level, Oxfordshire's peak is a little earlier and with a slightly less than 200 per cent increase on the late Iron Age level. Berkshire and Hampshire's numbers, however, peak by the end of the 1st/beginning of the 2nd century. To conclude, all counties but Buckinghamshire show a peak in the numbers of excavated settlements by the early to mid-2nd century. With the great expanse of the Weald, very largely empty of farms, the South-East counties betray a very distinctive pattern of settlement through the Roman period. Within these counties (Figs 1.2–1.3) the growth in numbers of farms (of all kinds) is strongly linked to, and builds on the overall settlement pattern of the late Iron Age with no obvious concentrations of new sites. Although there is some expansion in the hinterland of London, it is not particularly prominent and the clay soils are largely avoided. There is apparently no significant expansion of the Roman farmed landscape into either the Weald (other than for ironworking) or the clays and heathlands of north-west Surrey (and east Berkshire).

Several factors may account for this steep rise in the number of farming settlements through the 1st and into the 2nd century AD. The rapid growth in the manufacture and availability of pottery which, along with ceramic building materials, is the most ubiquitous aspect of Roman material culture in southern Britain, may have increased the archaeological visibility of settlements already in existence in the late

Iron Age. However, while the more stable political conditions which prevailed after the Roman conquest, and particularly after the settlement of the Boudican rebellion may have encouraged natural growth among the indigenous population, it is difficult not to see inward migration into Britain after AD 43 as the major contributor to the growth in settlement numbers. Alongside retiring veterans choosing to stay in Britain, there was clearly an influx of merchants and manufacturers in the wake of the advancing Roman army. If the rapid growth of London can be accounted for by the settlement of incomers of this kind, it is very likely that some of the wealth generated was invested in the acquisition of rural estates and may account for the early and conspicuous development of villas, particularly in north Kent and in close proximity to Watling Street, the main road to London from the Kentish ports of Richborough and Dover. The early villas in West Sussex, on the other hand, may owe their development more to investment by the leading families of the client kingdom of Togidubnus.

Moving to consider the mid- and later Roman periods, while there is some variability in the incidence and patterning of settlements in all the counties illustrated in [Figs 1.4–1.5](#) occupied in the 3rd and first half of the 4th century, there is consistency across all the counties considered here, and across the English regions examined so far more widely, for decline, occasionally steep decline, after the mid-4th century. However, the wider group of ten south-eastern counties ([Fig. 1.1](#)) provides a valuable opportunity to examine in greater detail the profiles of settlement change over time once the peak has been reached. There are important differences. For example, if we consider the evidence for all farms and villas in the four counties of Kent, East and West Sussex and Surrey ([Figs 1.1](#) and [1.4](#)) we can see that there is evidence of decline in numbers, particularly in the east, in Kent and East Sussex, but also in West Sussex and Surrey from as early as the mid-2nd century onwards. While the number of recorded settlements from East Sussex is small and possibly unrepresentative, the much larger sample from Kent shows a similar, dramatic decrease of about 50 per cent in the numbers of farms and villas occupied between the second half of the 2nd century (or from the beginning of the 2nd century in the case of East Sussex) and the second half of the 4th century. By the end of the 4th century the number of settlements occupied is less than it was in the 1st century BC. Across the Thames Estuary in Essex, the picture is very similar to Kent with a reduction in the number of settlements from a peak in the late 1st/early 2nd

century to a level by the mid/late 4th century similar to that of the late Iron Age. In West Sussex the decline is also striking, but of the order of 35–40 per cent, while in Surrey, the decline is only of the order of about one third, more or less the same as it is for Greater London which spans both north and south of the Thames. While there has long been an awareness of decline in iron-making in the Weald from the early 3rd century onwards (Cleere and Crossley 1985, 84–6; Hodgkinson 2008, 30–4; Hodgkinson, this volume), the picture which emerges from a systematic trawl of the excavated settlement data indicates that decline is more widespread and cannot simply be accounted for by a localised decline in the activities of the *Classis Britannica* and interest in Wealden iron. Just as in the period of rapid growth in the 1st and early 2nd centuries AD, there is no discernible patterning in the location of abandoned settlements in Kent and East Sussex (Figs 1.4 and 1.5). In contrast, however, if we look further west to the neighbouring counties of Berkshire, Buckinghamshire, Hampshire and Oxfordshire, there is little evidence of change until the second half of the 4th century, but even then the decrease is not as marked as elsewhere in the South-East. This is in a context where towns required inward migration to sustain themselves. Oxygen and strontium isotope analyses of 4th-century human teeth from the Lankhills Roman cemetery, Winchester indicate the presence of incomers both from elsewhere in Britain and from overseas. Perhaps as high a proportion as 40–50 per cent of the sampled population were brought up outside of Winchester (Chenery *et al.* 2010; Eckardt *et al.* 2009). By the end of the 4th century settlement numbers in all counties except for Buckinghamshire and Oxfordshire had reverted more or less to the numbers recorded in the late Iron Age.

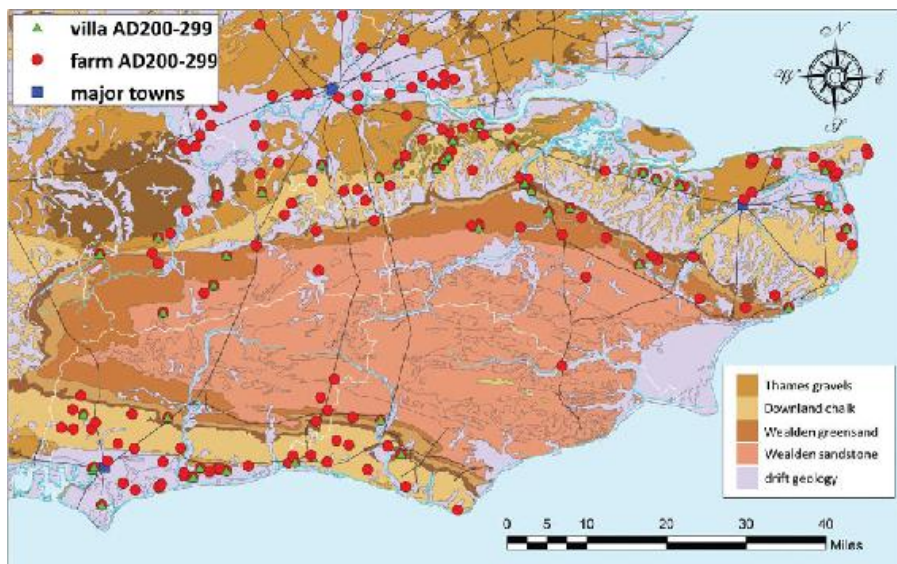


Fig. 1.4: Distribution of rural settlements, including villas, in relation to geology across Greater London, Kent, Surrey and Sussex in the 3rd century.

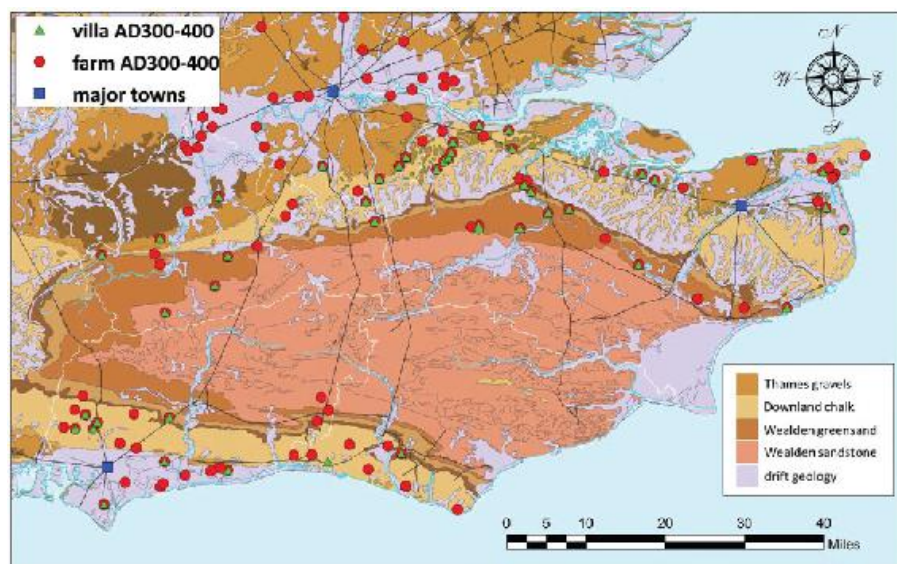


Fig. 1.5: Distribution of rural settlements, including villas, in relation to geology across Greater London, Kent, Surrey and Sussex in the 4th century.

Searching for explanation of change which appears to be restricted to a limited area of south-eastern Britain is difficult. Some have sought to see abandonments in the South-East related to the increase of seaborne raiding which lead to the establishment of the defended Saxon Shore. With a pattern of desertion shared either side of the

Thames Estuary it can be observed that a common element in the three south-eastern counties of Essex, Kent and Sussex was increased militarisation with the construction of new coastal forts from the early 3rd century onwards. If coastal raiding was ever a factor in desertions, the new frontier system did nothing to halt decline. Another possibility is that increased nucleation led to the abandonment of single farms, but the incidence of nucleated settlement in Kent and East Sussex and the South-East as a whole does not change markedly between the second half of the 1st century and the second half of the 4th century when there is evidence of decline similar to that seen among rural settlements in general. While other explanations, such as plague or confiscations, might be invoked, the marked localism of the area in which there is marked decline in settlement in the 3rd and early 4th centuries suggest a deliberate movement away, a reversal of the inward migration and settlement of the early Roman period. However, as new opportunities for settlement excavation arise in Kent and East Sussex, particular attention needs to be given to consideration of the context of abandonment. What circumstances can we identify in these counties to account for the increase in abandonments which are different from those prevailing in settlements further to the west which continue to flourish up to the late 4th century and later? By the same token, we also need to be alert to the emergence of new types of settlement in the wake of the abandonments.

This analysis has drawn on the histories of almost 600 settlements across ten counties of south-eastern Britain. While the relationship between these and the numbers of inhabitants occupying them may be a matter for further conjecture, concern about actual numbers of population may also be a distraction. What the excavated evidence can show is the dynamic of settlement: the extraordinary growth of the early Roman period up to a peak in the early-to-mid-2nd century, the flattening of the profile of occupied sites from the mid-2nd century onwards for most of these south-eastern counties up to the later 4th century, but also a localised pattern of steep decline, beginning as early as the mid-2nd century, in the three counties of Essex, Kent and East Sussex, derived from a sample of 179 excavated sites.

What implications do these conclusions have for the wider canvas of Roman Britain as a whole? First, contrary to the prevailing view that population reaches a peak in the later Roman period, particularly the first half of the 4th century, the evidence from the South-East (and

this is being confirmed across Roman England) suggests that population peaked by the end of the 2nd century. Second, this case study shows clear regional patterning, particularly in the pattern of decline of settlement numbers in the late Roman period, warning against any wider extrapolation from limited geographical coverage. Third, and in similar vein, the regional variation in numbers of settlements at different periods combined with the unevenness of coverage across different types of geology and soil means that extreme caution has to be exercised in extrapolating from sample study areas. For example, in the South-East, the lack of settlement on the heavy clays, including the Weald, indicates that it is inappropriate to use modern land-use data, such as the areas of grassland, arable, etc., calculated by Edwards and Wibberley (1971) and used by Millett as the basis for his estimate of population (1990, 181–6).

One further inference to be drawn from this regional study and the observations on the variability of settlement outlined above, is that, paradoxically (in light of the explosion of new data on settlement numbers since 1990), it is likely to lead to a general downward revision of actual population numbers of Roman Britain. Recent estimates from the province have always looked high in comparison with medieval and early modern population figures for England and it may well be that we will move back to a figure that is closer to, but probably less than the Domesday estimate of 1.75–2.25 millions.

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Chapter 2

The Environment of Southern Roman Britain

Petra Dark

Introduction

The environmental context is key to understanding the types of agriculture possible, and the availability of vital resources for industry, in southern Roman Britain. ‘Environmental’ evidence is also critical to understanding how these activities affected local soils, watercourses and plant and animal communities. Until recently there has been relatively little well-dated evidence for many aspects of the environment of this period (see overviews by K. Dark and P. Dark (1997, 18–42) and P. Dark (1999; 2000, 81–129)), but the last decade has seen a welcome increase in relevant data, allowing an increasingly detailed picture to be constructed.

Climate

Discussion of the climate of southern Roman Britain is hampered by a lack of evidence deriving directly from the area, necessitating extrapolation from sources elsewhere in the British Isles and northern and western Europe. Faced with this problem thirty years ago, Lamb (1981) used continental textual sources to collate references to unusual weather and seasonal temperature extremes to attempt a reconstruction of climate change in the first millennium AD. He suggested a climate similar to that of today at the start of the Roman period, with temperatures rising into the late 3rd and 4th centuries, when they may have exceeded those of today by around 1°C, perhaps accompanied by a period of relatively dry summers. There was then a return to colder conditions around the end of the Roman period. Subsequent evidence from a variety of more ‘scientific’ approaches (summarised by Charman 2010) has added to this picture, but does not require its total revision.

The evidence for climate most closely applicable to Roman Britain comes from studies of peat, especially from the raised and blanket bogs which occur widely in northern and western Britain. Variations in bog surface wetness are reflected in the types of vegetation growing on (and incorporated into) the peat, the state of preservation

(humification) of the plant remains, and the abundance and type of testate amoebae (single-celled animals) (Blackford 2000). One of the most detailed studies of this type, from Bolton Fell Moss in Cumbria (Barber 1981; Barber *et al.* 1994), suggested that relatively wet/cool conditions in the Iron Age were followed by a trend towards increasing dryness in the Roman period, then a return to wetter conditions after the Roman period. Subsequent peat-based studies from elsewhere in northern Britain, Ireland and continental Europe have provided evidence for dry phases during the Roman period and a wetter period commencing in the late Roman period or soon afterwards (e.g. Hughes *et al.* 2000; Charman *et al.* 2006; Swindles *et al.* 2010), suggesting that at least some of the climate shifts of the first millennium AD are synchronous across north-west Europe.

Such peat-based studies face difficulties of disentangling the effects of temperature and precipitation (Charman *et al.* 2009), a problem that is being addressed by a variety of other approaches to climate reconstruction. An example is provided by analysis of tree-ring sequences, which are increasingly being used not only for dating, but also as a source of chronologically precise evidence for past climates. Recent synthesis of a large database of oak ring width series from central Europe has provided estimates of late spring to early summer precipitation and summer temperature over the last 2500 years (Büntgen *et al.* 2011). Precipitation was found to have been generally above average from the late Iron Age into the Roman period until c. AD 250, followed by drying in the latter part of the 3rd century. Another period of increased precipitation occurred from the early 4th century, accompanied by relatively cool temperatures. Evidence for relative warmth in the Roman period, and colder conditions in the late Roman/immediate post-Roman period, also comes from dendroclimatological evidence from other areas of Europe, especially northern Scandinavia (Grudd *et al.* 2002; Esper *et al.* 2012).

Overall, it appears that the early to mid-Roman period was relatively warmer, and the mid-Roman period also drier, than today, followed by relatively cool and wet conditions at the end of the Roman period. These climatic fluctuations would have had implications for the character and extent of agriculture in many areas. The period of relative warmth would have provided the potential for expansion of farming into previously marginal areas, and to grow new crops. For example, there is evidence from several sites in Britain that grapes may have been grown, including planting trenches containing

grape pollen from Wollaston (Northamptonshire) (Brown *et al.* 2001). Warmer conditions would also have had implications for contemporary insect faunas (Kenward 2004), which may have included pests of the crop in the field and in storage (Smith and Kenward 2011).

Sea level and coastline

Parts of the coastline of southern Roman Britain would have differed significantly from that of today due to a combination of factors, including subsidence, erosion, silting and land reclamation. Some of the most obvious evidence of these processes comes from sites originally in coastal locations, such as the forts of the 'Saxon Shore'. Built on or near the coast in the 3rd or 4th century AD, several were subsequently stranded from the sea by silting (Burnham 1989; Pearson 2002). Richborough fort in Kent, for example, is now over 3km from the coast, overlooking and partly eroded by the River Stour. Other shore forts, such as Walton Castle, which lay near Felixstowe, have been eroded into the sea, however, demonstrating the variability of coastal processes.

The main technique for reconstructing long-term sea-level change is sedimentological analysis of coastal deposits and their contained biological remains (mainly pollen, diatoms and foraminifera), with radiocarbon dating of key stratigraphic boundaries (sea-level index points). In recent years there has been a substantial increase in the amount of such data available for production of Holocene sea-level curves for Britain overall (reviewed by Shennan and Horton 2002; Gehrels 2010), including from the south coast (*e.g.* Massey *et al.* 2008, and see review by Waller and Long 2003), but unfortunately most remain poorly dated for the last two millennia. Particularly detailed recent studies have been undertaken on the Romney Marsh complex (*e.g.* Long *et al.* 1998; 2006; 2007; Waller *et al.* 1999), culminating in production of a series of maps showing the development of Romney Marsh and the Dungeness Foreland from *c.* 3000 BC (Long *et al.* 2006; 2007, 197–203). Here, the extensive area of peat that formed in later prehistory underwent progressive marine inundation through the Iron Age and Roman periods. A tidal inlet (the Hythe inlet) existed in the north-eastern part of Romney Marsh in the Roman period, overlooked by the late Roman fort of Lympne (Cunliffe 1988).

In addition to evidence from sediment sequences, the presence of archaeological sites currently or formerly close to the sea can be used

to estimate the degree of sea-level change since the Roman period, an approach adopted by Waddelove and Waddelove (1990). For the southern half of Britain, their figures for the degree of relative sea-level rise range from 2.2m (since the late 3rd century) at Caerleon in south-east Wales to 4.4–4.5m in the East Anglian Fens. Similarly, for the Scilly Isles, Thomas (1985, 24–34) used the presence of archaeological sites and field boundaries now in the intertidal zone to attempt to reconstruct the changes in sea level that resulted in formation of the present group of islands from a single land mass. He argued that most of the islands were united until at least the end of the Roman period, with a sea level some 4m below that of today, not separating until the medieval period. Subsequently, however, Ratcliffe and Straker (2000) used radiocarbon dating of intertidal peat deposits (originally formed above sea level, and then submerged by sea-level rise), to suggest a less dramatic change, with a Roman-period sea level around 1–1.6m below that of today. Recent research as part of the Lyonesse Project – a study of the evolution of the coast of Scilly – suggests that the peat dates produce the more realistic model (Johns 2011).

Much of the research into coastal change in the southern half of Britain has involved a combination of archaeological and palaeoenvironmental approaches, exemplified by the long history of study of the East Anglian Fens (Hall and Coles 1994; Waller 1994) and Severn Estuary Levels (summarised in Coles and Coles 1986, 24–39; Bell 2001). The prehistoric wetlands of the Severn Estuary were transformed in the Roman period by construction of sea defences and systematic drainage works (Allen and Fulford 1986; 1987; 1992; Fulford *et al.* 1994; Rippon 1996; 1997; 2000a; 2000b; 2001), at a time when sea level was around 1.3m lower than today (Allen and Fulford 1987, fig. 1c; Allen 1991). Analyses of plant and animal remains preserved in these reclaimed wetlands (summarised by Bell 2001, 88) suggest that they were primarily used for pasture, but with some cereal cultivation also. Most of the Levels were flooded after the Roman period, resulting in deposition of a thick layer of alluvium, but in part of the Wentlooge Level the remains of elements of the Roman drainage system can be traced in the modern landscape (Allen and Fulford 1986; Fulford *et al.* 1994; Rippon 2000b, 66–7).

Recent research has shed much light on the coastal zone of other parts of southern Britain, including Langstone Harbour, Hampshire (Allen and Gardiner 2000), and the estuaries of the rivers Crouch and

Blackwater in Essex (Wilkinson and Murphy 1995). While no general reconstruction of the coast of Roman Britain is possible due to the wide range of factors affecting coastal topography and evolution, the picture is becoming increasingly refined for small stretches of the coast, allowing a greater appreciation of how local settlement and land-use were influenced by changing sea levels and coastal processes, and how these environments were modified for specific purposes. Exploitation of coastal resources was widespread in some areas, including the use of drained wetlands for farming, as noted above for the Severn Estuary Levels, salt-working, as in Essex, Kent and more widely along the south coast (summarised in Murphy 2014, 78–80; see also Biddulph, this volume), and perhaps even oyster farming, raised as a possibility for the harbours of Langstone and Chichester (Allen and Gardiner 2000, 84, 217). Fishing must presumably also have played a significant role in the economy of at least some coastal settlements, but evidence for this is elusive.

Rivers and alluviation

Fluctuations in climate and sea level in the course of the Roman period must both have affected river systems, but superimposed on these were changes in catchment land-use resulting in complex patterns of variation in channel form and depositional history that can be difficult to interpret. In particular, there is ongoing debate over the relative roles of climate change and human activity in driving flooding and alluviation since later prehistory, with several recent attempts to correlate the occurrence of fluvial deposits thought to be indicative of flooding with the record of climate change from mires etc. (Johnstone *et al.* 2006; Macklin *et al.* 2005; 2010). Johnstone *et al.* (2006) used a large database of radiocarbon-dated fluvial deposits from Britain to compare fluvial activity in the lowland unglaciated catchments of southern and eastern Britain with that in upland glaciated areas. They identified ‘very few flood units between c. 2050 and c. 900 cal BP’ from lowland river systems, but found evidence for major episodes of flooding at 2150 cal BP (200 BC) and 1650 cal BP (AD 300), both periods of relatively wet climate, as noted above.

In addition to such predominantly sedimentological studies of fluvial history, the archaeology of alluvium has received much attention over the last 20 years (*e.g.* Brown 1997; Howard *et al.* 2003). An area of particularly intensive research has been the Upper Thames Valley, where many sites have been excavated in advance of gravel

extraction, and extensive environmental sampling and analysis has been undertaken (summarised in Booth *et al.* 2007). Here archaeological evidence indicates a rising water table, with seasonal flooding of some lower floodplain sites, by the middle Iron Age (Robinson and Lambrick 1984; Robinson 1992; Booth *et al.* 2007, 17–18). Alluviation followed from the late Iron Age or Roman period, interpreted as a response to the increased sediment load in the river resulting from expansion of agriculture onto clay soils. During the late Roman period seasonal flooding and alluviation probably extended over the entire floodplain. The changing floodplain environment inevitably required reorganisation of agricultural activity, with conversion of arable to pasture as conditions became wetter, and prompted the emergence of the management of grassland as hay meadow (Booth *et al.* 2007, 20–9).

The Middle Thames also experienced increased flooding and alluviation in the Roman period (Booth *et al.* 2007, 17–18), although here the evidence is less extensive – much of it from the palaeochannel sequences at Dorney (Parker and Robinson 2003; Parker *et al.* 2008). The Roman town of Staines, which lay on a gravel island at the confluence of the river Colne with the Thames, was repeatedly flooded from the 2nd century AD causing major erosion and damage to buildings (Jones 2010, 8–9, 25).

Knowledge of the evolution of the Lower Thames and its tributaries has benefitted from the many opportunities for excavation arising from development in London, including the Jubilee Line Extension Project (Sidell *et al.* 2000) and in advance of construction of the Olympic Park (Powell 2012). Detailed investigations have been undertaken on how the form of the Thames in London has changed since settlement in the mid-1st century AD. At this time the river flowed up to 700m south of the present Southwark waterfront along a network of intersecting channels between islands of higher ground and mudflats (Graham 1978). The discovery of 1st-century waterfronts on the north bank indicates that it lay some 100m north of the current channel, and a series of later waterfronts show the gradual advance of the north bank to its present position (Milne *et al.* 1983). The river in central London was tidal in the mid-1st century (Battarbee 1988), with a range of at least 1.5m, and may have been up to 1km wide (including wetlands) at high tide. At low tide it was about 275m wide at its narrowest point, compared to 200m today. At the end of the 1st century the downward progression of the Roman quays suggests a fall

of water levels, continuing into the 4th century with an overall decline of perhaps 1.5m (Milne *et al.* 1983; Brigham 1990; Wilkinson *et al.* 2000, 17). At least some of the tributaries flowing into the Thames in London changed significantly in the Roman period also, as demonstrated for the Walbrook, which underwent drainage and reclamation, including canalisation of streams, in the late 1st–early 2nd century (Maloney 1990).

The changing character of rivers and their floodplains in the Roman period would have affected the potential for different types of agricultural and industrial activity, and have implications for the transport of their products (as discussed by Ellis Jones 2012). While increased flooding may have rendered some areas unsuitable for cultivation, deposition of alluvium would have increased soil fertility. Changes in river and stream courses affected access and movement on floodplains, in turn influencing patterns of land use and the siting of many types of industrial activity which relied heavily on water as part of the production process or for transport. In the Lea Valley, for example, investigations in advance of construction of the Olympic Park revealed evidence of hemp-retting in the Roman period (Wyles *et al.* 2012, 325), in which hemp stems were soaked in pools of water as part of the process of manufacturing textiles and rope.

Soils

Agriculture in southern Roman Britain extended across a wide range of soil types, including heavy clays, probably aided by changes in plough technology in the course of the Roman period. Although the light wooden ard of the Iron Age continued in use, the later Roman period saw the introduction of heavier ploughs able to penetrate the soil more deeply. From the 3rd or 4th centuries this was aided by the introduction of the coulter, which cut through the soil ahead of the share (Rees 1979, 59–61), and the asymmetric share, of a type that would be expected from a mouldboard plough. Such a plough both cuts and turns the soil, enabling cultivation of heavier soils.

Extensive woodland clearance and ploughing resulted in changes in hydrology and soil mobilisation, as noted above in relation to deposition of alluvium in river valleys. Eroded soil could also be deposited as hillwash (colluvium) towards the base of slopes, and in the form of lynchets where movement was restricted by field boundaries. Colluviation has been found in many chalkland valleys to have begun in the Neolithic or Bronze Age (e.g. Allen 1992; Bell 1992;

Bennett *et al.* 1998, 272, 279), but was sometimes much later. The Roman villa at Rock, Isle of Wight, was constructed (in the late 3rd century) on, and buried within, thick deposits of chalky hillwash. The hillwash beneath the villa contained remains of the garden snail, *Helix aspersa*, a Roman introduction, indicating that it accumulated during the Roman period (Speller *et al.* 2009).

Although alluvium added nutrients to soils in many river valleys, generally increased agricultural intensity probably resulted in soils becoming thinner and more impoverished, especially in areas which had been under the plough for centuries. The extent to which soils suffered nutrient depletion will have depended on the original nature of the soil and its substrate. It appears that during the Roman period attempts were made to improve the nutrient status of soils by adding manure and household refuse. The widespread pottery scatters found in Roman-period field systems are usually assumed to reflect the spread of midden material on fields (Gaffney and Tingle 1989, 210, 224–5). It is also likely that animals were released onto the fields during fallow periods to add manure. Chemical analysis may assist in identifying arable areas where nutrient enrichment has been attempted, as demonstrated by Macphail *et al.* (2000) for Scole, Suffolk, where areas with enhanced levels of organic phosphate were argued to represent arable fields to which organic matter had been added. Chalk may have been applied to clay fields to improve soil texture: a 1st- or 2nd-century pit from Bullock Down, East Sussex, may have been a marling pit used for this purpose (Drewett 1982, 104–5), and Bird notes the presence of Roman chalk pits at Ashted and other sites in Surrey (Bird 2004, 77).

Crop rotation may have been employed to reduce soil exhaustion if yields declined. Rotation involving legumes would have been especially beneficial because of the ability of such plants to ‘fix’ atmospheric nitrogen. Hints of crop rotation come from finds of non-cereal crops mixed in with cereal assemblages from Roman-period sites, suggesting survival of the previous year’s crop. For example, flax (*Linum usitatissimum*) and ‘Celtic bean’ (*Vicia faba*) have been found together with cereal remains in a corn drier at Barton Court Farm, Oxfordshire – a group of plants which is highly unlikely to have been grown together deliberately (Jones 1981, 113).

Drainage was employed on a variety of scales to extend the area of cultivable land, or maintain the possibility of cultivation where waterlogging was a problem. In addition to major reclamation, as

noted above for the Severn Estuary Levels, drainage was widely used on individual farms to maximise use of the available local soils. In the Upper Thames Valley there were many settlements with ditched enclosures and fields, as at Ashville, Abingdon, and Farmoor (Parrington 1978; Lambrick and Robinson 1979).

Overall, it appears that the Roman period saw the development of a variety of ways to overcome unfavourable soil conditions, allowing both more intensive use of areas with a previous history of cultivation, and extension into new areas. Interestingly, in considering the distribution of villas in South-East England in relation to geology and soils, Bird (2004, 80–3) notes that they tend to be sited close to geological boundaries. This may have been to allow exploitation of as wide a range as possible of different soil types (including heavy soils on clays, such as the London Clay and Weald Clay) with contrasting potential land-uses, and perhaps also because of the presence of springs in such locations.

Vegetation

The extent of agricultural settlement and associated field systems (*e.g.* Taylor 2007) attest to the widespread existence of cleared and farmed land in southern Roman Britain, but reconstruction of the nature and extent of semi-natural vegetation types in those areas not directly used for farming relies on evidence from a variety of biological remains. While plant and animal remains from archaeological contexts ('on-site' remains) provide important information about site economy, they can also be used to reconstruct the character of the immediate surroundings where it is possible to distinguish between those imported to the site from those which occurred there naturally. This is well demonstrated by the extensive analyses of biological remains from waterlogged and other contexts from Roman-period sites on the floodplain and gravel terraces of the Upper Thames Valley (reviewed in Booth *et al.* 2007, 20–8): at Farmoor, near Oxford, for example, a combination of plant and invertebrate remains were indicative of a local environment of open grassland (Lambrick and Robinson 1979, 118–9), while at Barton Court Farm, Abingdon, the farmstead/villa was shown to have occupied an area of arable and pasture (Jones and Robinson 1986, 21; Robinson 1986).

Such on-site evidence cannot, however, be assumed to be representative of the wider environment away from the direct influence of the individual site. To gain a picture of the general

character of the environment in terms of vegetation cover, and how it changed over time, deposits that formed in natural contexts such as peat bogs and lakes are usually more suitable. The main technique for reconstructing past vegetation from such deposits is pollen analysis (for a description of its application to historic-period environments see P. Dark 2000, 2–7). Pollen analysis is particularly valuable for reconstructing the nature of the environment in terms of the relative amounts and types of woodland and open land. It provides less information about agricultural land use because many crops do not produce diagnostic pollen grains – of the cereals, only rye (*Secale cereale*) can be identified with certainty. Furthermore, pollen production of crop plants is generally low and the pollen poorly dispersed, so they are strongly under-represented in the pollen record. There can be a positive side to this under-representation, however, in that where cereal pollen does occur in off-site pollen sequences, it may provide good evidence that cereals were cultivated locally.

A problem with attempting to use pollen analysis for reconstructing the environment of southern Roman Britain is that natural lakes and extensive peat bogs are much rarer in the south than in the north and west of Britain. Furthermore, where peat deposits are present, the upper layers have often been affected by drainage and/or peat-cutting. Smaller areas of organic accumulation, such as wetland areas in valley-bottoms and around springs, can provide valuable alternative sources of pollen-bearing deposits, however (e.g. Fyfe *et al.* 2004). Former river channels provide a further potential source of pollen sequences from the region (e.g. Greig 1992; 2004; Parker *et al.* 2008), but such sequences often suffer from the presence of frequent hiatuses in deposition and reworking of their contained plant remains. Even where pollen sequences have been produced from historic-period deposits, they may lack radiocarbon dates for the part of the sequence spanning the Roman period, or the pollen sampling interval may be too large to ensure that any of the pollen samples actually falls within the Roman period – both problems that affected the sequences from Devon analysed by Fyfe *et al.* (2004) in a project specifically designed to investigate the development of the historic-period environment of south-west Britain.

Since the relatively well-dated pollen sequences relating to Roman Britain were previously reviewed by the present writer (P. Dark 1999; 2000, 89–119), the number of sequences has increased considerably, to the benefit of recent research such as the Fields of Britannia Project

(Rippon *et al.* 2013). Here I shall concentrate on discussion of selected sequences particularly relevant to the themes of agriculture and industry.

Sidlings Copse, Oxfordshire, is today a small area of woodland occupying a valley close to the site of a Roman villa (Headington Wick (Jewitt 1851)), and within the production area of Oxfordshire were pottery (Young 1977). Textual and cartographic sources show that it was previously part of a larger block of woodland within the medieval Royal Forest of Shotover and Stowood (Day 1990), but pollen analysis from waterlogged deposits in the valley bottom indicates that this woodland originated long after the end of the Roman period (Fig. 2.1) (Day 1991; 1993). Most of the original lime (*Tilia*)-dominated woodland on surrounding well-drained soils had already been cleared well before the start of the Roman period, resulting in a very open landscape which was at least partly used for cereal cultivation. On the wetter soils of the valley bottom, alder (*Alnus glutinosa*) seems to have disappeared entirely in the course of the Roman period, being replaced by willow (*Salix*). It is possible that willow was deliberately encouraged to provide a renewable source of fuel, along with the limited remaining areas of hazel and oak woodland.

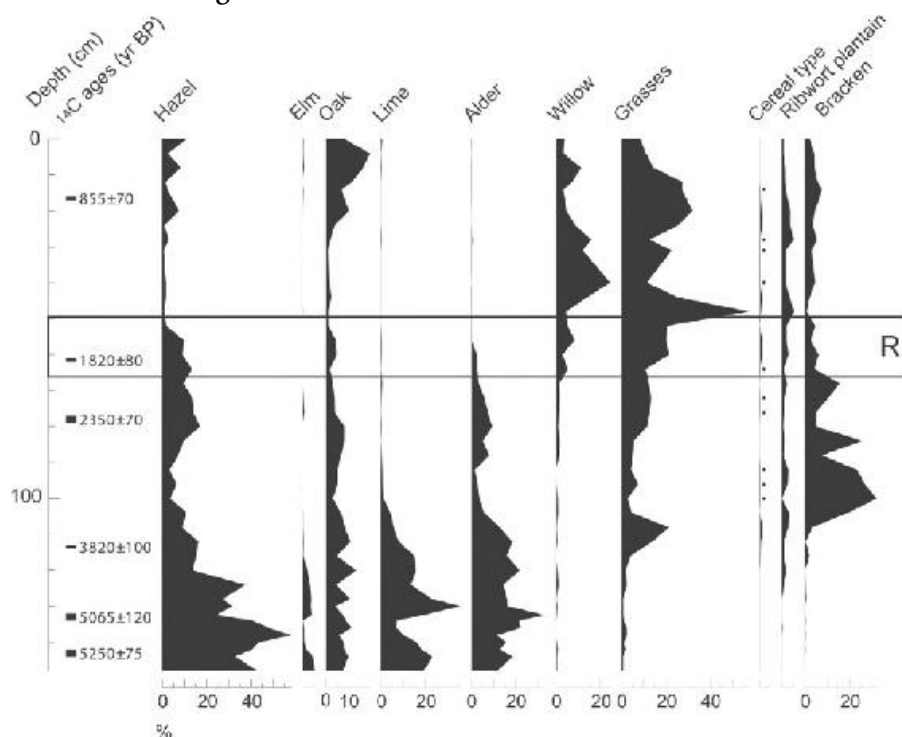


Fig. 2.1: Summary pollen percentage diagram from Sidlings Copse,

Oxfordshire (selected taxa from Neolithic and later deposits only), showing the estimated position of the Roman-period part of the sequence (after Dark 2000).

A contrast to this site is provided by Epping Forest in Essex. Epping Forest today is a large expanse of woodland dominated by beech (*Fagus sylvatica*), and contains many large ancient beech pollards (Fig. 2.2). There is little archaeological evidence for local Roman-period activity, but the Iron Age hillfort of Ambresbury Banks lies within the wooded area. The original pollen sequence by Baker *et al.* (1978) was poorly dated and had a very coarse sampling interval (poor temporal resolution), but new research on a sediment sequence obtained by the writer and Michael Grant has addressed these problems (Grant and Dark 2006). The new sequence, a summary of which is shown in Fig. 2.3, shows very little clearance of the original woodland, which was again dominated by lime, prior to the Roman period. In the first half of the Roman period the woodland changed in character and became more open, with the virtual disappearance of lime – which is highly sensitive to disturbance – and a major increase of birch (*Betula*). It was at this time that beech began to increase, marking the beginning of an expansion phase that led to its present dominance at the site. There is a little cereal-type pollen in the Roman-period deposits, but the continued dominance of tree pollen and relatively low proportion of pollen of herbs, including grasses, indicates that the site remained largely wooded and clearance for agriculture was limited. The change in species composition of the woodland apparently occurred rapidly, suggesting that it is unlikely to have resulted from climate change or natural soil changes, with human activity the most likely cause. A possible explanation is that cattle were grazed in the woodland, feeding on both ground vegetation and any parts of the more palatable trees within reach. Leaves of lime, in particular, are highly palatable to cattle, and the tree will eventually be eradicated from woodland where grazing pressure is substantial.



Fig. 2.2: Ancient beech pollards near Lodge Road Bog, Epping Forest (photograph: author).

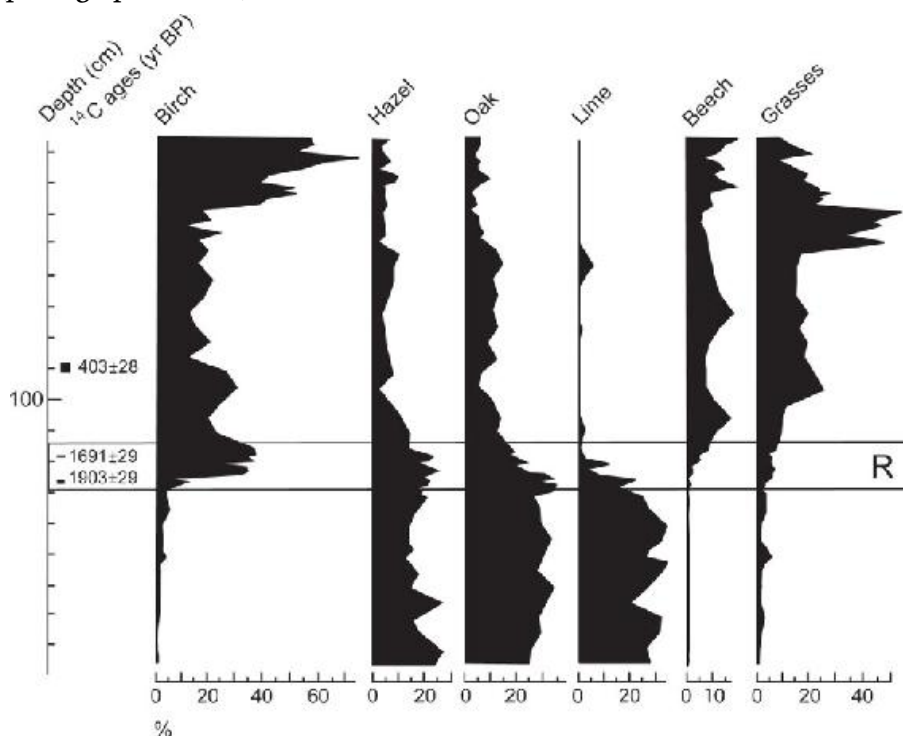


Fig. 2.3: Summary pollen percentage diagram from Lodge Road Bog, Epping Forest, Essex (selected taxa only), showing the estimated position of the Roman-period deposits (pollen counted by Michael Grant).

It is possible that the wood pasture system that prevailed in Epping

Forest, and other areas of woodland, in the medieval period, had its origins in the Roman period. In wood pasture, animals were grazed on grassland between the trees, the trees being pollarded (cut at around head height) to prevent animals from browsing on the shoots. The shoots could then be used for leaf fodder, fuel, or wattle-work, in a similar way to the products of coppicing.

Another medieval Forest, again with extensive areas of beech woodland, which has recently been the subject of renewed palynological research is the New Forest, Hampshire. Here beech did not become a significant component of the woodland until the medieval period or later (Grant and Edwards 2008), again apparently in response to grazing.

A pollen sequence from Barrow Moor, in Mark Ash Wood, has the potential to shed light on the landscape context of the New Forest Roman pottery industry, as it lay within 1km of a cluster of Roman pottery kilns (Grant *et al.* 2009). The area remained predominantly wooded throughout the Roman period, with oak (*Quercus*) and hazel (*Corylus avellana*) on drier soils and alder in wetter sites. Lime had been dominant in prehistory, undergoing a substantial decline in the early Bronze Age but not disappearing completely until the Roman period. This, together with the presence of pollen of various herbs, and possibly also cereals, suggests that the woodland underwent some form of disturbance in the Roman period, potentially including management to provide fuel for the kilns, but also clearance and grazing/browsing.

Provision of fuel would also have been a key consideration for Roman-period iron production. The environmental context of the Wealden industry is illustrated by several pollen sequences from the adjacent Romney Marsh complex (Waller and Schofield 2007a; 2007b). It had been suggested (Cleere and Crossley 1995) that part of the Weald was incorporated into an 'imperial estate' from which activities other than ironworking were excluded, but pollen sequences from close to the town of Rye (particularly that from Pannel Farm in the Pannel valley) show a fairly consistent presence of cereal pollen in the Roman-period deposits, accompanied by evidence for soil erosion, suggesting local arable activity (Waller and Schofield 2007a; 2007b, 17–18, 20, 72). Furthermore, there is little change in the extent and character of woodland from the late Iron Age into the Roman period, suggesting that the fuel demands of the iron industry did not result in major woodland destruction.

Evidence for the effects of smaller-scale Roman-period industrial activity has recently been provided by a highly detailed pollen sequence from an abandoned clay pit on Ashted Common, Surrey, adjacent to the site of a Roman industrial complex with a villa, bath-house and tile kilns (Waller 2010). Peat accumulation in the pit appears to have begun soon after the complex was abandoned – thought to have been in the early 3rd century AD. Despite the local industrial activity, some woodland (predominantly of oak and hazel) survived around the site, the extent of which increased after this activity ceased. Evidence from fungal spores suggests that the area around the pit was at least lightly grazed after the end of the local industry, and this grazing continued throughout the rest of the Roman period.

Consideration of the pollen evidence overall indicates that parts of the landscape of southern Roman Britain were very open – in some areas the extent of woodland was no greater than that of today. Large-scale woodland clearance had begun at many sites in the Bronze Age and early Iron Age (P. Dark 2000, 40), but in some areas there was further clearance in the Roman period, resulting in a landscape with a mixture of farmland and semi-natural and natural vegetation types. Where extensive tracts of woodland survived, as in Epping Forest and the New Forest, there is evidence for woodland disturbance/exploitation which may have included forms of woodland management (discussed further below). Occasionally pollen analysis provides evidence for woodland regeneration in the Roman period, suggesting abandonment of farmland. At Rims Moor, Dorset, for example, woodland clearance, associated with cultivation of rye and possibly hemp, had peaked in the late Iron Age or early Roman period (Waton 1982; 1983) but was followed by a decline in the extent of open land.

Managing the environment

In addition to the extensive areas of farmland in southern Roman Britain, ‘semi-natural’ environments – natural environments modified by human activity – played a key part in agricultural and industrial production. Woodland was an essential source of materials for construction and fuel, and could also provide some plant foods (including hazel nuts and berries, such as elderberries, blackberries and sloes) and animal fodder, but was scarce in some areas. It is likely that woodland management, in the form of coppicing and pollarding/

wood-pasture, was used in such areas to maximise the availability of particular products.

There is now much evidence for Roman-period management of woodland in southern Britain, including the remains of wattle-work, using the long straight poles produced by coppicing, from waterlogged archaeological contexts such as pits and wells (e.g. Robinson 1979, 81; 1986), and charcoal assemblages from which ring-width counts demonstrate systematic cutting at particular growth stages (e.g. Barnett and Stafford 2011; Barnett 2012). Especially remarkable is the discovery of a coppice stool (probably of oak, but possibly chestnut) in a Roman pit at Farmoor, Oxfordshire (Robinson 1979, 81). Study of the very large amount of waterlogged wood and timber recovered from Roman-period contexts in London has provided fascinating insights into the character of the woodland that provided the source of this material (Goodburn 2001). This ranged from very large straight oaks which grew in dense 'wildwood'-like conditions to hazel poles from short-rotation coppice.

Recent analysis of charcoal assemblages, probably representing kiln fuel, associated with the Alice Holt pottery industry in Hampshire, has shed interesting light on the selection and management of wood for fuel (Barnett 2012). Charcoal assemblages from Groom's Farm, Frithend, were dominated by oak and hazel, the hazel mainly from rods cut at 5–10 years. Some of the oak had been cut at a similar range of ages, but there was also major use of more mature wood. The results provide good evidence that (presumably local) woodland was managed by rotation coppicing, perhaps mixed with standard oaks in the form of a 'coppice with standards' system.

Grassland management was also widespread and probably took various forms. Most grassland in southern Roman Britain owed both its creation and maintenance to human activity. Where drainage is adequate, grassland quickly reverts to woodland unless colonisation by trees is prevented by grazing or mowing. If grassland is managed for hay, animals must be excluded for most of the growing season to prevent loss of the hay crop. In Britain, management of hay meadows seems to have begun in the Roman period, on the basis of evidence from both artefacts and plant remains. Scythes first occur in Britain in the early Roman period, at sites such as Farmoor in Oxfordshire and Great Chesterford in Essex (Rees 1979, 475–7), or possibly in the late Iron Age, as perhaps at Dorney, Buckinghamshire (Parker *et al.* 2008, 481), and may have been used for cutting both hay and cereals. More

direct evidence for hay meadows comes from waterlogged plant remains. Several sites in the Upper Thames Valley have produced assemblages of plant remains containing characteristic hay-meadow plants, including Claydon Pike (Robinson 2007) and Thornhill Farm (Robinson 2004, 144). At Farmoor a 2nd-century pit contained cut hay, with remains of such characteristic meadow plants as ox-eye daisy (*Leucanthemum vulgare*) and yellow rattle (*Rhinanthus* sp.) (Robinson 1979, 118).

Conclusion

On the basis of existing evidence, the environment of southern Roman Britain appears to have been highly favourable for agriculture. The climate seems to have been a little warmer and drier than today in at least part of the Roman period, offering the potential for cultivation of grapes and other relatively warmth-demanding crops. Soils would have been relatively fertile compared to those of today, but strategies were in place to improve their productivity where necessary, including manuring, liming and perhaps rotation including legumes. Flooding will have constrained the types of activity possible on some floodplains, but alluviation produced especially rich fertile soils, which in some areas were managed as hay meadows. Much of the original woodland cover had been cleared in prehistory, but in some parts there remained the potential to increase the cultivable area by further clearance.

Where it survived, woodland was a valued resource for a variety of domestic, agricultural and industrial purposes. Some woodland may have maintained its untamed 'wildwood' character and provided a source of large structural timbers, but it is likely that woodland management was widespread to provide fuel, wattle work etc. Woodland also provided a source of browse for domestic stock, and perhaps cut leaf fodder from pollarded trees.

Despite recent advances in the quality and quantity of evidence, consideration of past environments in relation to agriculture faces the difficulty that many of the key constraints on crop production are difficult, or currently impossible, to reconstruct in detail. Yields are strongly affected by seasonal patterns of temperature and rainfall, including the occurrence of frosts and periods of drought, but the climatological data currently available do not allow the impact of these to be assessed. Crop losses to pests and diseases are hugely significant to modern farmers, yet little is known of their prevalence

in the past (P. Dark and Gent 2001). Such problems are in addition to the more general need to fill gaps in the geographical distribution of most types of evidence, such as pollen sequences, and the chronological constraints imposed by the errors associated with radiocarbon dating.

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Chapter 3

The Countryside of the South-East in the Roman Period

David Bird

Introduction

This paper aims to provide a brief overview of the geographical and historical background for the Wealden counties in the Roman period. It will also touch on some aspects that do not otherwise receive much coverage in the succeeding chapters, including particularly the Weald and the effect that the foundation of London had on the area as a whole.

The South-East has three of the earliest-established county archaeological societies but archaeological work in the region has always faced difficulties caused by high population pressure, a high percentage of woodland, land use that is not favourable to fieldwalking or aerial photography (further complicated by the proximity of London's main airports), and complex and difficult subsoils. The latter often affect the survival of bone (see *e.g.* Chaplin 1968; Charles 2008, 335) and other environmental evidence. A lack of good building stone in most of the region and what seems to be general use of surface-built timber buildings makes it difficult to find and visualise 'farms' and 'villages' (Bird 2000, 159; Goodburn 1991, esp. 185, fig. 2). There is generally little evidence for the wider landscape except on the river gravels and sometimes on the Chalk, and it is doubtful how much this can be applied directly to other soil types.

Development pressure has intensified in recent years, leading to more discoveries, although to some extent the results are biased by proximity to London. It has become difficult to keep up with the explosion of new evidence so the current national project is very welcome (see Fulford and Allen, this volume). Even so, there is still less evidence than is often thought to be the case and new discoveries can add significantly to our understanding. Recent work on sites dug long ago, such as Folkestone and Ashted, shows that information from early reports must be treated with care but also that finds and

archives from old excavations contain important information and are ripe for reassessment (see e.g. Booth *et al.* 2011, 392-4; Fig. 3.1).



Fig. 3.1: Ashtead Roman villa room 6; excavation in progress 1926. Note the tree cover. (Photograph in Surrey Archaeological Society research collections RR242/7. A version was published in Lowther 1927, pl. 4).

In recent years Roman Britain has often been treated as though it is an entirely anomalous episode in our island's continuing history. A more balanced approach makes it possible to appreciate that land use and settlement patterns tend to have local continuity, tempered of course by changes in climate, farming techniques, population pressures (or the reverse) and so on. Taking this background and the underlying geology into account is an approach recently advocated by McCarthy (2013, 14–30) but arises naturally from the study of regions through time, which can lead to a more balanced assessment of the Roman period in any locality (e.g. Rowe and Williamson 2013, 14–15; cf. Bird 1996; 2004a).

The geology of the South-East is particularly varied (see Figs 1.2–1.5) and this has clearly had an effect on settlement patterns, evident even today (for a very good summary see Brandon and Short 1990, 4–13). 'Nowhere in Europe is there a region of similar size allowing the study of such a variety of rocks and a corresponding variety of plant, animal and human life'. There is an 'extreme diversity of soils', and although 'the relationship between geology, farming, employment and

landscape is by no means one of simple determinism, ... the soils have exerted a profound influence on agriculture, and it is impossible to divorce geology from any consideration of topography, rural settlement, agrarian history and vernacular architecture' (*ibid.*, 6–8, citing Hall and Russell (1911, 1–15), whose book has the added value of being written before the worst of the effects of modern farming; *cf.* Roberts 2014, 53).

The most fertile lands are on the coastal plains of west Sussex and north Kent, not surprisingly the areas most heavily settled in the mid-11th century (Darby and Campbell 1962, 586, fig. 168), and to a lesser extent the Greensand belt along the spring line below both North and South Downs. The gravel terraces of north-west Surrey are not as fertile as might be expected (see Bird, Surrey, this volume). Otherwise the land is often poor, or difficult for earlier forms of agriculture, frequently with heavy clays and infertile sands. The valleys of rivers and smaller watercourses offer amelioration of these soils and the Darent valley in Kent was particularly attractive to villa-type settlement (Bird 1996, 220, 223). It is important to recognise the differences between North and South Downs, as the image of open rolling downland is far from true in the north, where superficial deposits such as Clay with Flints lead to very different soils (see *e.g.* Fig. 1.2).

The effect of geology and topography on Roman-period settlement patterns is considered in the individual county papers in this volume. Here it may be noted that there are few major towns in the South-East and until recently only a few 'small towns' or smaller nucleated settlements were known. The area falls within Oliver Rackham's 'ancient countryside' and is likely always to have been very different from middle England (Rackham 1986, 3–5). On any small-scale distribution map, for example showing Roman settlement distributions, it is easily possible to read the broad sweep of the country's geology, and a very similar pattern can still be seen in nucleated settlement of the 19th century (Fig. 3.2). In both cases, heavier settlement in north-east Kent and the Sussex coastal plain stands out, as does the line along the Greensand south of the North Downs, while the more sparsely settled areas can also be seen to match.

Similar pointers to the effect of the land are the comparative lack of Roman burial evidence and the distribution of coins and non-coin objects recorded in the Portable Antiquities Scheme (Fulford and

Holbrook, 2014, 42; Moorhead and Walton 2011; Pearce and Worrell, 2014, 33). The gaps in the Weald, on the Bagshot Beds of north-west Surrey and adjoining counties, in Middlesex and in south Essex are noticeable. Only some of this can be put down to such factors as urbanisation and detectorists searching ‘good’ areas. For the London area and the Weald there is some confirmation that it is a valid picture because the Roman Rural Settlement Project has matched reported Roman settlement evidence against all excavations undertaken (Martyn Allen in lecture, March 2015). The Project is making it possible to develop a sense of different regions that tend to confirm that Rackham’s ancient countryside/planned countryside split was present in some form in the Roman period as well; note for example that there are few ‘complex farms’ in the South-East (Allen 2016, 84–6).

Sense of place must surely also have influenced local ritual, especially in a world geared to react to natural phenomena (*cf.* Bird 2004b; [Fig. 3.3](#)). ‘In many parts of the South-East it is possible in a short walk to encounter almost every type of sedimentary rock and *mood of scenery* [this writer’s emphasis] within lowland England’ (Brandon and Short, 1990, 6). ‘It is not just through the rosy spectacles of childhood that we remember the landscape of the 1940s to have been richer in beauty, wildlife, *and meaning* than that of the 1980s. It was ...’ (Rackham 1986, 25) – and how much more so in the Roman period. The sense of place must have been important too in creating ‘communities’ (though often lacking from recent discussion). Anyone brought up in the South-East would readily recognise the concept of ‘**horizontigo** – n., *the malaise induced by sustained exposure to flat terrain; the sudden feeling of fright brought about by contemplation of an intensely lateral terrain*’ (Macfarlane 2015, 37).

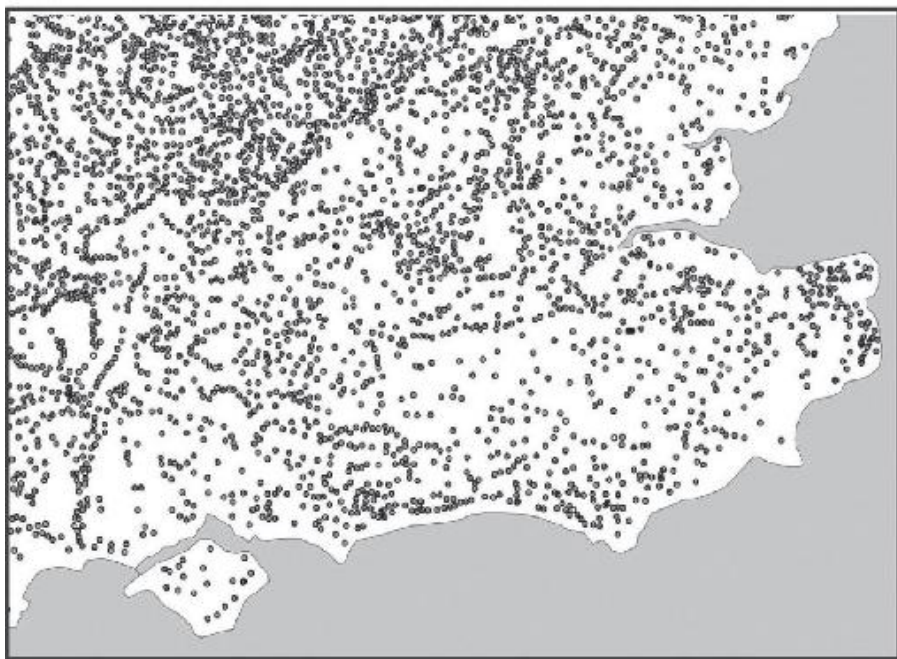
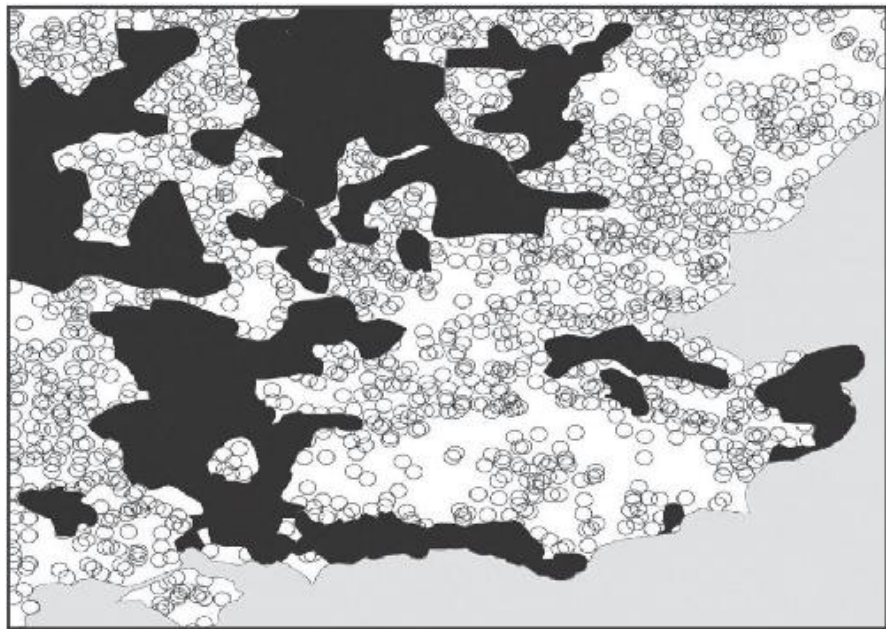


Fig. 3.2: Comparison of overall settlement in the Roman period (top) and nucleated settlement in the 19th century (after Taylor 2007, 24, fig. 4.1; Roberts and Wrathmell 2003; illustration: Alan Hall).



Fig. 3.3: Topography and woodland south of the North Downs. A view from Ranmore Common, Surrey (photograph: John Edwards).

Early history

The events of AD 43 probably brought little change to most of the population of the South-East. There is evidence for continuity on the majority of sites in the countryside (Allen 2016, 83). Probably the area was *de facto* a Roman province from the time of Caesar, paying tribute and providing hostages (*cf.* Lintott 1993, 31; Creighton 2006, 19–30).

The geography of the South-East, especially the Weald (see further below) is one of the many reasons why Dio's narrative (60, 19–23) cannot easily be squared with a landing in Kent. Use of the long-established Seine-Solent crossing is more likely (see Bird 2002 and Sauer 2002 for the arguments and references to other points of view). Speaking of the invasion by Asclepiodotus in AD 296, Salway notes that this crossing 'has the advantage of a choice of excellent landfalls in the Southampton region ... and access directly into the heart of Britain' (Salway 1981, 308). Such a landing leads naturally into an

advance to the Silchester area, where there is increasing evidence for an early military presence (Booth 2013, 337). This would have placed Roman forces in a key strategic position, almost certainly with local support to the south and with the option of easily reacting to events to north, east and west – such as the episode of the Dobunni (Bird 2002, 259). Probably by the end of AD 43 much of south and east England was within Roman control, with the most advanced winter quarters at the centrally-placed fortress at Alchester in Oxfordshire (Sauer 2005). It had taken little effort for Roman forces to achieve this position: Claudius himself stressed the lack of bloodshed (Bird 2002, 261–2).

The date and function of the supposed invasion-period defensive system at Richborough is open to question (Manley 2002, 93–100). A fleet base, possibly even active in the years before AD 43, similar to Velsen in Holland (Lendering and Bosman 2012, 64, 74), would make far more sense of the location (for which see Hawkes 1968, 225; *cf.* Millett 2007, 141–3). The few hints of other evidence for military sites in the South-East may be related to the aftermath of the Boudican revolt, although this probably had relatively little effect on the area (recent summary in Hoffman 2013, 100–5).

After the ‘invasion’ much of the South-East was placed within the client kingdom of Togidubnus (see also Rudling, this volume). It is unlikely that he is to be equated with Dio’s Togodumnus (*contra e.g.* Hind 2007, 98–100); the Romans could readily have found more suitable options. Coates (2005, 363–4) makes the case that the element Togo- is British, while Togi- is Gallic, which accords with our understanding of the situation. [T]ogi- is attested by inscription in Chichester, in an area that has good evidence for strong and probably dynastic Gallic links (Manley 2008, 44–5, 49). The kingdom may have included Kent as well as Sussex, Surrey and perhaps further west. Three major towns in this territory all had amphitheatres: Fulford (2003, 102) suggests that the provision of such structures at Silchester and Chichester may be connected to their early importance as political centres, and in that case attention is drawn to Richborough, which seems to have been of more importance than Canterbury at first (Millett and Wilmott 2003, 185–7; *cf.* Fulford 2003, 97). When the client kingdom was absorbed into the province at some point in the later part of the 1st century it was perhaps split between the *civitates* of the Atrebatas and Cantiaci to the north of the Weald, the Reg(i)ni to the south and (probably) the Belgae to the west, all to some extent Roman inventions (*cf.* Bird 1996, 222).

Thereafter, government of the region was through the main towns, whose theoretical control in the case of Silchester and Canterbury probably extended right up to the south bank of the Thames at London (see further below).

The effect of London

The South-East in the Roman period cannot be fully understood without reference to the creation of London. It is generally agreed that the city was a new foundation, perhaps a little before AD 50. It was apparently carefully placed as a trading centre mirroring the location of those on the great rivers of Gaul as they approach the coast. It was clearly outstandingly successful because of the new circumstances, but it was not located in a natural centre geographically. Some have suggested that it was deliberately placed on the boundary between Iron Age communities (*e.g.* Creighton 2006, 95). Perhaps the almost neutral position was seen as an advantage.

Apart from the gravel terraces along the Thames, a wide area around London is not attractive to settlement. As noted above, decades of excavation in Greater London have only served to emphasise the effect of the London Clay. There is also nothing to suggest a ring of villas around the city (Bird 2000, 156–7). The existence of the new city thus challenged the geography of the area, providing an artificial centre that had to be given new access roads (Bird 1999). Creighton (2006, 94) argues that it was geared to military requirements but the army was already stationed much further away and could have been supplied more directly. It is more likely that the new foundation served the expanding market for a ‘Roman’ way of life (the bubble that famously burst when loans were called in by the likes of Seneca (Salway 1981, 115–6)).

The artificial area of Greater London creates a mental image that has tended to obscure the relationship between London and its immediate hinterland. Although parts of Kent, Surrey, Middlesex and Essex have been absorbed they should not be ignored in consideration of the wider South-East in the Roman period. Until relatively modern times, most of the area around the city was fields and villages still part of their respective counties, and even Southwark was still in Surrey until the later 19th century. There is no reason to suppose that Roman London was any different in exercising formal control over its hinterland (Bird 1996, 222). Nevertheless, it must have had a considerable effect, especially along the new road network (*cf.* for a

well-studied area around Wroxeter, White 2014, 7–8).

In the case of London, it is likely that, as in the medieval period, the requirements of a large population gave rise to specialisation of production in the surrounding area (Bird 1996, 223–6). Given the diversity of habitats in the South-East, it must be likely that settlements or groups of farms came to specialise in particular crops or animals, the latter in turn providing the raw materials for clothing and bone-working, and there were probably many settlements closer to the city whose livelihood depended on woodland management (see further below). There may even have been unusual specialisms such as the growing of the saffron crocus in the Croydon area (Bird 2012). The distribution of villas suggests that they favoured particular locations which implies that usually there was a focus on a particular kind of production; the concentration along the Darent valley might suggest that it was the major source of London's grain. The fertile Sussex plain and North-East Kent probably provided for further afield as they usually did in the middle ages (Bird 1996, 223) and no doubt in the pre-Roman period, serving the trade noted by Strabo (4, 5, 2).

Stone

Specialisation of production is of course readily accepted for pottery, tiles and types of stone, the first two of which are discussed elsewhere (Rayner, and Betts, this volume). The South-East could supply some stone suitable for masonry and also for some specialist purposes including whetstones and querns (Allen 2015; Green, this volume). The main building stone was Kentish rag from the Maidstone area which was quarried from the 1st century and later on was widely used across south-east Britain (Pearson 2002, 82). It was probably moved by river up the Medway and thence to places like London in small vessels of the Blackfriars 1 type (Millett 2007, 167–8). Use in some of the Shore Forts has led to the suggestion that at least some of the quarries were imperial property but no convincing evidence can be offered in a recent review, which also cannot point to any Roman period quarries (Elliott 2014). It is to be hoped that some may yet be located.

'Reigate' stone (*i.e.* stone from the Upper Greensand in Surrey) was also used from early on; it is known from a pre-Boudican context in Southwark (Drummond-Murray and Thompson 2002, 25–6). Although it is not a particularly good stone its use seems to have continued possibly to the 3rd century, as suggested by a late Roman genius

figure from a well under Southwark Cathedral (Coombe *et al.* 2015, 35 no. 56, pl. 36; cf. Sudds 2011, 107). Of particular interest are blocks used at the stokehole end of the Reigate tile kiln perhaps to be dated around AD 100; there are reasons to suppose that they were seconds from a quarry which is likely to have been somewhere nearby (pers. comm. Emma Corke; Fig. 3.4).

A recent find from the villa at Abinger in Surrey (Fig. 3.5) serves to highlight the Roman-period industry devoted to producing fine polished table tops and the like using the Paludina limestone from the Weald, sometimes called ‘Sussex marble’. Similarly, Allen has identified ‘a major industry based on Wealden (early Lower Cretaceous) sandstones’ from the Weald Clay formation in the north-western Weald, producing whetstones with a widespread distribution in Roman Britain, though curiously not in the South-East (Allen 2015, 247–50). The use of Horsham stone for roofing is also attested (*e.g.* Williams 1971, 189). In all of these cases the quarries are unknown and call for work in the field. Local quarries are sometimes noted for building materials such as flint, sand and chalk but in the area just east of Ewell excavation by Pre-Construct Archaeology has recently produced evidence for extensive Roman-period chalk quarries that are industrial in scale (pers. comm. Jon Cotton). These are surely to be linked to the large-scale production of lime, and not intended just for marling fields, which may be attested elsewhere (*e.g.* Rudling, this volume).



Fig. 3.4: View of the stokehole end of a large tile kiln near Reigate,

showing the worked stone blocks, probably seconds from a nearby quarry (photograph courtesy of Surrey County Archaeological Unit).



Fig. 3.5: Cocks Farm, Abinger: polished Paludina limestone slab probably from the villa bath-house (photograph: Isabel Ellis).

Woodland

There were almost certainly a great many trees in the South-East in the Roman period (see also Dark, this volume). Caesar frequently mentions woodland in the account of his British campaigns, including the comment that the Britons had refuges hidden in dense woodland (*De Bello Gallico*, 5, 21). Even today Surrey is the most wooded county in England, with West Sussex not far behind (for a historical survey of woodland in the South-East see Bannister 2007). Trees in the area grow so well that it can cause problems for dendrochronology: at Moorgate in Roman London ‘most of the material was too fast grown ... to warrant tree-ring dating’ (Goodburn 2005, 191); the same problem has been noted in attempts to date Surrey’s historic buildings (pers. comm. Rod Wild).

Visser (2010) summarises the evidence for tree-growing practice in the Roman world, including clear felling in cycles; selection of trees; pollarding; coppicing; and the use of manuring. It is, however, difficult to find convincing evidence for woodland management locally, although this option should be kept in mind as a possible

significant function for some settlements and enclosures. Inevitably, as often with crops and animals, the best evidence comes from towns, especially from waterlogged deposits such as those along the Walbrook in London. Recent discoveries there stand as a strong reminder of aspects of a major industry that is so often missing from the archaeological record and yet was of vital importance for buildings, drains, enclosures, furniture, modes of transport, all manner of objects (including basketry), messages and records, fuel and even other uses such as tanning (*cf.* McKinley 2004, 28; 48; 54). The surviving floor of a building and a possible amphora storage tank in Southwark are also noteworthy (Brigham *et al.* 1996; Taylor-Wilson 2002, 23–6).

Woodland management was clearly a major concern and is likely to have involved private individuals in the same way as other enterprises. The only document we have from London concerning land ownership refers to a wood (Tomlin 1996 (although there seems to be no reason to suppose that it was a sacred wood)). Veal (2012, 242) suggests for Silchester ‘that the inhabitants of different houses were accessing slightly different supply areas. Perhaps some individuals owned, or had access to, particular woodland lots with slightly varying characteristics’. A similar comment is made for wood fuel used in pottery kilns at Moorgate (Goodburn 2005, 196). Research in Picardy led to the conclusion that areas of approximately 50 sq km were needed around larger Roman settlements to supply them with wood and timber (Visser 2010, 18–19). There is good reason to suppose that the immediate surroundings of London were used in this way: Hall and Russell (1911, 74, 85) comment as late as the start of the 20th century that the only sensible use of the London Clay and Clay with Flints was as woodland (for a brief summary of relevant later evidence see Bird 1996, 229 n.22).

Goodburn (2005, 196–7) suggests that wood fuel was supplied from nearby as was probably the case in the high medieval period, and provides a very useful summary of the accumulating information for the variation in the woodland of the areas serving Roman London: coppice, from three up to as many as 40 year rotations; open managed woodland; areas of surviving wildwood; field or hedgerow oaks; alder probably growing along watercourses; backyard trees; orchards (see also Campbell, this volume). There is evidence for coppicing as close as the outskirts of Southwark (Howe *et al.* 2005, 289–90). Goodburn notes that oak was the norm for timber although the surviving

evidence is likely to be biased for various reasons. Veal (2012, 242–3) concludes that the evidence from Silchester points to oak-based, mixed deciduous woodland which was being continuously exploited throughout the Roman period. Charcoal from the Westhawk Farm settlement also suggests a plentiful supply of oak from the vicinity (Challinor, 2008, 349), and there were similar results at the Wyphurst site in Surrey (Poole 2008, 285–6). The overall impression for the South-East is of readily available oak woodland, and the limited evidence suggests that there was no shortage of wood fuel and timber throughout the Roman period (see further below for the Weald), although it may have been necessary to travel further for especially large timbers.

The Weald

General studies tend to suggest that a lack of archaeological fieldwork leads to the assumption that clay soils did not attract early settlement, but historical evidence indicates quite clearly that the London Clay and the Weald Clay were truly difficult (it is noticeable that neither figure in Mills and Palmer 2007). The Weald is taken here to mean especially the Weald Clay and the sands and clays of the High Weald encompassed within it, the whole surrounded by Greensand and Chalk.

It seems clear that the Weald Clay (the Low Weald) was often very difficult terrain that did not encourage permanent settlement except in favoured spots, which is not to say that it was not a resource for the surrounding communities (*cf.* Brandon and Short 1990, 13). In wet weather the Clay was a serious barrier to traffic. William Cobbett records taking around one and a half hours to cover three miles on horseback near Ewhurst (Woodcock 1967, 163). Daniel Defoe records from personal experience a sight near Lewes, ‘Which indeed I never saw in any other part of England ... a lady of very good quality I assure you, drawn to church in her coach with six oxen; nor was it done in frolic or humour, but meer [*sic*] necessity, the way being so stiff and deep, that no horse could go in it’ (Cole and Browning 1962, vol. 1, 129). There are many such records and they cannot simply be dismissed as travellers’ tales (*contra* Hind 2007, 102, who was misled as Cobbett is talking of the Low not the High Weald). The High Weald has thus always been somewhat isolated. Its mixture of sands and clays is sometimes fertile but it is much broken up topographically so settlement has tended to be small-scale and dispersed. The Wadhurst

Clay is the most important source for ironworking.

There is evidence for Iron Age occupation particularly along the river corridors such as the Mole, the Arun and the Adur, and it is generally considered that use of the resources of the Weald may have been controlled by the hillforts on its edge, such as Holmbury, or even within the High Weald as at Dry Hill Camp (Gardiner 1990, 43). Transhumance is suggested for this period, and indeed earlier, although difficult to prove (summary in Harris 2002, 18–26). There is also some evidence for pre-Roman ironworking (Hodgkinson, this volume).

The creation of the client kingdom may have been the catalyst for greater exploitation of the western Weald. It is likely that the London-Chichester road, Stane Street, was constructed around AD 50 not primarily for military purposes but as part of a package that included the foundation of London (Bird 1999). It was a major engineering project, crossing some of the worst of the Weald Clay, providing a direct all-weather connection between two of the country's major links to the Continent as well as between the palace at Fishbourne (and the other early villas in Sussex), the growing town at Chichester, and the burgeoning trading centre on the Thames.

Other cross-Weald roads were added at roughly regular intervals (probably closer in the west to facilitate links between north and south), from the roadside settlements, known or postulated, on the main river crossings on the east–west Greensand Way in Sussex. Margary's classic book (1965) remains the most complete examination of the evidence. The possible effect of these roads may be gauged from the result of the building of a later turnpike road: 'a writer in the *Gentleman's Magazine* in 1763 remarks upon the great increase in Sussex corn in Dorking market after the making of this road', and this naturally caused a fall in price (Malden 1912, 436 n.147). Margary indeed suggests the supply from Sussex of corn, as well as iron further east, as a purpose of the roads in the Roman period (1965, 93, 124). Harris (2002, 22–3) notes a curiosity of the road alignment which seems to suggest a link to pre-existing transhumance routes, and it may be that the assistance of transhumance was another objective.

Although it is often assumed, there is no reason to suppose that the rivers were of much use for transport in the Weald proper (*cf.* Brandon and Short 1990, 13). Settlements near the rivers are likely to have been there because of better soils and water (and an added supply of food). They include Alfoldean on Stane Street, where a *mutatio* was

established, typically at a river crossing, on a site with no evidence for Iron Age occupation (Luke and Wells 2000, 80; Thompson 2006, 28). It developed into a nucleated settlement and presumably served as a local centre for the villas at Wyphurst and Rapsley. It has been suggested that the stone-built phase at the former site may have been replaced by buildings at the latter around AD 200 (Hayman 2008, 290) which implies that if there was an intention to open up the area it was something of a failure. Indeed, Coates (1981, 66–7) proposes that the local place-name Dedisham might be derived from the word *mutatio*, which suggests that this aspect of the Alfoldean settlement was seen as the overriding one, a very welcome stop in rather wild-seeming territory. There is so far little sign of similar stops on the other cross-Weald roads; perhaps the site at Money Mound, Lower Beeding in Sussex is representative of a custom to make offerings before venturing across the more remote areas (Beckenshall 1967, 20).

There are few proven Roman settlements in the Weald proper except those associated with ironworking, mostly in the High Weald. It is noticeable that villas in the South-East almost all avoid it (Bird 2000, 158, fig. 9.3; Taylor 2007, 34, fig. 4.9). Exceptions such as Chiddingfold and Garden Hill (perhaps a villa) follow on from Iron Age enclosures and may also be explained in other ways, as a ritual centre and associated with ironworking and tile-making respectively (Graham and Graham 2011, 188–9; Money 1977; Rudling 1986). Gardiner (1990, 46–7), trying hard to make a case, has to accept that ‘Roman settlement seems to have been mainly peripheral’, and apart from a few tantalising hints such as a possible stone-founded building at the Broadhurst ironworking site near Crawley there remains little to suggest villa-type settlement. Broadhurst followed on from Iron Age activity, and seems also to have had post-built structures in a ditched enclosure, and Roman pottery including samian and mortaria (Cartwright 1992, 33–5; Rudling 1992). As well as Alfoldean, some nucleated settlements on the edge of the Weald probably served in some way to make use of the resources, including Westhawk Farm (Booth *et al.* 2008) and a regular series of sites in Sussex (Rudling, this volume). Some of these may have been involved in interacting with the ironworking sites.

Aspects of the distribution of pottery and tile suggest that even with the made roads the Weald may still have acted as something of a barrier. In the most remote area in East Sussex, locally-produced pottery continued with little change from the late Iron Age up to

about AD 250; other evidence supports the impression of a backwater (Green 1980, 82–5). It seems that pottery from production sites to the north rarely reached the southern side of the Weald whereas material from further west could reach either side. This suggestion is based on research carried out several years ago (Tyers 1996, 127–92 *passim*) but it is unlikely that the overall pattern will have changed greatly as a result of recent work (e.g. for BB2 see Millett 2007, 167, fig. 5.25). Thus Nene Valley mortaria are largely absent south of the Weald, as are Nene Valley and Colchester colour-coated and Hadham red-slipped wares or Verulamium-region mortaria or white ware. Black Burnished 2 and South Midlands shell-tempered wares are also noticeably absent. In all cases this material reaches sites along the northern side of the Weald. In contrast Oxfordshire red/brown-slipped ware and the products of the Alice Holt/Farnham and Black Burnished 1 industries travel around both sides. The point is valid whether or not the distribution is secondary to something else being transported. It is interesting to note that the implication is that, at least to quite a large extent, distribution must be by land.

The distribution of relief-patterned box tiles shows a similar effect. Apart from die 4 and a few oddities, only Alfoldean and Rapsley buck the trend that not much crosses the Weald apart from noticeably strange collections at Lullingstone and Chatley Farm, near Cobham in Surrey (Betts *et al* 1994, *passim*). The latter at least indicates that this happened in the 4th century (Frere 1949, 88), and it may be suggested that these sites were making use of *spolia* from a wide area at a time when new products were hard to come by. There were tileries in the Weald, usually to be associated with nearby settlement, such as Wykehurst Farm (Goodchild 1937) near Rapsley and Alfoldean, and Hartfield, perhaps serving Garden Hill and nearby ironworking sites but also apparently villas at both Beddington to the north and Beddingham to the south (Rudling 1986; Middleton *et al.* 1992, 52–3). If this is correct the implications for the supply network are of considerable interest, including the intriguing hint from the place-names of an association between these villas (or the land on which they were set) continuing into the Saxon period (Gover *et al.* 1934, 40; but see Ekwall 1960, 34; *cf.* Copley 1950). There are relief-pattern die links between the production sites at Ashted, Reigate and Hartfield which may in turn indicate an association of some sort (Betts *et al.* 1994, 71–2).

The lack of villas and nucleated centres in the Weald, apart from

Alfoldean, has caused some to postulate an imperial estate, but this is unlikely (summary in Harris 2002, 24–5; Hodgkinson, this volume). Green (1980, 85) points out that ‘it can be argued that East Sussex was a backwater *before* the conquest’. Only the large-scale eastern group of ironworks is likely to have been in imperial control, with *Classis Britannica* involvement. This major production seems to have ceased by the end of the 3rd century, although smaller-scale ironworking elsewhere probably continued (Hodgkinson, this volume).

Apart from the production of iron, use of the Weald is mostly a matter of speculation. One might imagine boar hunts but as the area mostly lacks inscriptions we unfortunately cannot expect the equivalent of the well-known altar from Stanhope, County Durham referring to the killing of a particularly fine specimen (RIB 1041). It is possible that domesticated animals, such as pigs or cattle, were regularly driven into the Weald for summer pasture, probably a longstanding tradition (Harris 2002, 18–26). It might be relevant in this context that David Rudling (2013) notes a predominantly South-East focus for boar figurines, suggesting that they might actually represent ‘semi-wild pigs’ and drawing attention to the large number of pig offerings at the Chanctonbury Rings temple. Clearly there is a need for more evidence about transhumance, which may be hard to come by given the soil conditions (*e.g.*, for Westhawk Farm, Charles 2008).

It is unlikely that the Weald was used for the supply of timber and fuel to major towns because of the distance involved; they could probably have satisfied their needs from much closer (see above). Clearly fuel for ironworking would have been produced locally and this must have occupied a considerable workforce, but it is now generally accepted that it did not lead to widespread clearances (Veal 2012, 240–1; Dark, this volume). In the mid-8th century it was possible for Sigeberht, a former king of Wessex, to be ‘driven away into the Weald’, where he lived until stabbed by a ‘herdsman’. In the late 9th century the Anglo-Saxon Chronicle shows pride in the ‘great forest which we call Andred. This forest from east to west is a hundred and twenty miles long or longer, and thirty miles broad’ (Garmonsway 1954, 46–7, 84–5).

There is still a need for much more evidence for the situation in the Roman period (and others), but even in modern Surrey it remains quite clear that the Weald is different. It is probable that in the Roman

period the Weald was at times a serious obstacle, but less so for locals, for whom it was a resource too – and for a while on the eastern side a resource for imperial authorities, for the production of iron.

Later history

It is clear that there were significant changes in the landscape of the South-East in the 3rd and 4th centuries and that the later Roman period was very different from earlier on, both in town and country (e.g. Bird 2000, 165; Rudling 1988, 179; Booth *et al.* 2008, 395). The effect in the countryside is becoming much clearer thanks to the work of the Roman Rural Settlement Project (see Fulford and Allen, this volume). It is likely that there was more change around the middle of the Roman period than in AD 43, or indeed about AD 410.

The apparent reduction in settlement, especially in Kent and Sussex, may be better understood as a significant change, for which there could be several causes, rather than as a decline (but see also discussion in Booth, this volume). One of the reasons for a changing landscape may be the introduction of a heavier plough (Breeze 2014, 4); another, increasing pastoralism. Differences between east and west in Britain suggest that it is also likely that historical events were involved, possibly starting with the episode of Albinus and Severus (Salway 1981, 217–25). The effects are often seen in terms of the northern frontier, but it should be remembered that large bodies of troops are likely to have marched through parts of the South-East. Perhaps the resulting unsettled times offer an explanation for the small fortifications at posting stations that may date to about this time (Rudling 2003, 114–15), or the surprisingly early walls at Rochester (Esmonde Cleary 2003, 81–2). The Reculver Shore Fort is also of about this period (Philp 2005, 206–18), marking the start of the fortifications along the south coast and probably the beginnings of a frontier zone that would gradually develop around the south and east coasts.

In due course the ‘rebellion’ of Carausius and Allectus will again have led to considerable military activity in the region, including, it may be noted, their use of Frankish units, prominent when the main imperial re-invasion came via the Solent (Salway 1981, 308–11). Later still the so-called *barbarica conspiratio* of AD 367 involved the death of the Shore Fort commander and the breakdown of society in the South-East (Salway 1981, 368–81). These events will all have had an effect.

The most recent book on AD 410 (Haarer 2014) is noteworthy for

its lack of much attention to the South-East, although this is surely a crucial area for understanding the change from Roman Britain to Anglo-Saxon England. The ‘Saxon Shore’ was, after all, specifically a frontier command with a higher-ranking commander (Johnson 1976, 71). Most of the early 4th-century crossbow brooches that should be in the more militarised areas are found in the south and east of the province (Swift 2000, 44–50). Curiously, the distribution of single coins struck after AD 402 is similar, while in marked contrast mapping of above average late 4th-century coin loss leaves the whole of the South-East a blank (Moorhead and Walton 2014, 106, fig. 2 and 111, fig. 7). This also should have a tale to tell.

Increasingly, there are pointers towards an understanding of the origins of the ‘Saxon’ period that differs greatly from the traditional Bede-inspired story. A good case can be made for increasing ‘germanisation’ of the South-East long before AD 410, fostered and made possible by being in the Empire (cf. Roberts 2012, 39, for north-east England). As well as the units at the Shore Forts and associates of the largely Germanic field army, billeted in towns, there may well have been incomers settled to work the land to try to maintain it in use (cf. Burns 2003, 304–5). Some of the resulting mix of people, led by those having military authority, could gradually have turned into ‘Saxons’ (a catch-all grouping) and in due course their ‘kings’ as times changed. These ‘kings’ were eventually furnished with suitable back-stories to justify their status, sometimes involving ‘landings’ suspiciously close to Saxon Shore Forts (e.g. Garmonsway 1954, 13–14).

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Chapter 4

Kent Roman Rural Settlement

Paul Booth

Synopsis

Kent is rich in evidence for Roman rural settlement but the distribution of this evidence is unbalanced, quantitatively towards the north and east of the county and, as far as excavated evidence goes, has been until relatively recently disproportionately focussed on villas. Do these emphases reflect the real character of the rural settlement of the county or do they result from a variety of other factors? A broad brush characterisation of the rural settlement pattern, particularly using data from selected recent fieldwork projects, will be used as a basis for attempting to address these and other questions, before a brief consideration of what seem to be some of the most important issues currently relating to rural settlement in the region. This review also takes account of some aspects of the ‘small towns’ of Roman Kent, on the basis that these tend to be integral to local rural settlement patterns in a way that the more formal nucleated sites are not.

Introduction: setting the scene

A brief summary such as this is inevitably partial. It may draw unduly on evidence from projects with which the writer is most familiar (for example, the work synthesised in Booth 2011a; Andrews *et al.* 2015), and in more general terms will emphasise the results of some substantial infrastructure-related projects, both because their scale affords glimpses of (admittedly very incomplete) rural landscapes rather than just of individual settlements and also because their planning tends to result in the opposite, in archaeological terms, of the traditional practice of cherry picking sites (essentially villas) for excavation. A further key aspect which makes these projects particularly significant is that they typically incorporate systematic collection and examination of biological evidence for the rural environment and economy, while such work has not been a regular characteristic of earlier excavations. The history of work on rural settlement in Kent has been broadly in line with national trends, which is to say that until relatively recently it has tended to be

dominated by the examination of villas, with a typical concentration on the prestigious principal structures of such complexes, and generally much less attention paid to evidence that would have illuminated the agricultural economy which underpinned many, though perhaps not all, such sites in the county (see Millett 2007, 151). In his 1983 review of the Cantiaci, however, Alec Detsicas realised that ‘farmsteads’, the primary class in his rural settlement hierarchy, formed the majority of rural settlement sites in the county (Detsicas 1983, 83). Characterised as ‘usually with round huts and ditched enclosures’, these sites were nevertheless disposed of in just over a page, while 40 pages were devoted to the discussion of some 15 ‘villa estates’, the latter distinguished from other rural settlements and individual buildings which were designated as farms and isolated bath-houses (c. 18 pages). To be fair, this imbalance reflected a paucity of evidence for the lowest echelon of the settlement hierarchy, but it also reflected a characteristic top-down view of Roman rural settlement – that the villas were, by definition, all that ‘mattered’ in rural Roman Kent – the two aspects forming a self-sustaining pattern. Despite the gradual adjustment in the balance of evidence resulting from work in the last twenty years or so, some more recent reviews have still tended to adopt a very traditional top-down approach to rural settlement. Recent work, particularly in a development-led context, allows us to take a rather different perspective and here the aim is to emphasise where possible the ‘ordinary rural settlements’, rightly regarded as ‘key to any understanding of settlement patterns’ (Millett 2007, 156). This trend is now emphasised by the work of the rural settlement grey literature project (for Kent see Allen 2013), which is assembling and analysing the data in ways not possible in the present inevitably more superficial review.

The evidence base

As already indicated, overall distributions of evidence for Roman Kent, whether in the form of settlement evidence or simply a gross distribution of findspots of material culture, show a concentration of such evidence in the north and east of the county (e.g. Andrews 2004, 24). Amongst factors which influence this pattern are the relative concentration in these areas not only of historical development and other activities, such as quarrying, but also of arable agriculture, all of which have resulted in the more frequent recovery and recording of archaeological evidence than has been the case particularly, for example, in the Wealden part of the county, where the effects of these

intrusive activities are cumulatively much reduced. In more recent times these trends have been continued, if not exacerbated, by the intensity of modern development, particularly in the northern part of the county, and the corresponding concentration here of development-led archaeological work, sometimes on a substantial scale. In relation to this even the relatively (but not completely) random transects of the landscape offered by a variety of linear projects: road schemes such as A2 Bean-Cobham, West Malling and Leybourne Bypass, Wainscott Bypass, A253 Widening and East Kent Access, and pipelines such as Weatherlees-Margate-Broadstairs and Eynsham-Horton Kirby have tended to be located in the north of the county in areas already known to contain relatively high concentrations of sites of Roman date, and the important evidence which they have produced does little to redress the imbalance in the concentration of data for this period. The largest of these schemes, the Channel Tunnel Rail Link Section 1 (now known as High Speed (HS) 1) is a partial exception to this situation, adding a significant number of new sites in the Vale of Holmesdale/Chart Hills region below the scarp of the North Downs. Even here, however, this linear area was already known to contain a moderate density of late Iron Age and Roman sites, compared to the landscape zones of the North Downs and the Weald adjacent on each side. These regional trends are seen clearly in the mapping of sites examined for the Roman Rural Settlement Project (Fig. 4.1; Allen 2013, 'Roman records vs. NMR dataset'; see now Allen 2016).

The relative concentration of villa-type sites in northern Kent, noted above, may therefore be another reflection of the overall evidence bias in this area, but there are other aspects of the broad characterisation of rural settlement which perhaps give different perspectives. The review by Taylor (2007) allows some of these to be seen within a much wider context. Amongst the most distinctive characteristics of Roman rural settlement in Kent which emerge from this work is a preponderance of enclosed settlement in the eastern part of the county, including Thanet (Taylor 2007, 25, fig. 4.2), which is notable notwithstanding the overall concentration of settlement in this area. Other general settlement forms tend to have distributions which mirror the overall pattern of variation in settlement density, but the distribution of 'open' or unenclosed settlements, admittedly a relatively small sample, is broadly complementary to that of the enclosed sites and focuses on the central and western parts of north Kent, this settlement form being absent from Thanet in Taylor's mapping (2007, 27, fig. 4.4). The latter also shows a correlation

between the densest concentrations of villas and the overall settlement densities, but while the distributions of both rectilinear (but non-villa, in Taylor's terms) buildings and cemeteries and burial groups broadly follow the same trend, both of these categories also show relative concentrations in the middle part of the Medway valley. These patterns are broadly reflected in the more recent dataset compiled by the Roman Rural Settlement Project, which has an emphasis on excavated sites rather than the broader brush range of evidence used by Taylor.

The broad view, therefore, begins to suggest some potentially interesting variation in the gross patterns of rural settlement types, but excavated data are needed to elucidate further trends. One of the most significant of these relates to the chronology of settlement origins. Recent excavations, in particular, show that a large proportion of early Roman farmsteads were already occupied in the late Iron Age if not earlier, while the Rural Settlement Project dataset not only supports this in suggesting little disruption in this pattern in the mid-1st century, but also indicates expansion of the settlement pattern in the early post-conquest period, with new sites established particularly in the eastern and north-western extremities of the county. This pattern is unsurprising, but is important for our understanding of the basic character of Romano-British society; the fundamental pattern of early Roman settlement is a native one and is not immediately impacted by the events of the conquest. The trend of settlement continuity is widespread, but it is also variable within the wider south-eastern region, so it is significant that we can sometimes distinguish between areas where Roman period settlement developed straight out of long term settlement patterns, on the one hand, and those areas, for example parts of Kent, where such 'deeper' continuity is largely absent. Here numbers of settlements apparently expanded very substantially in, but not usually before, the late Iron Age. Champion (2007, 119–20) suggests that the fact that 'Settlement sites dating to the final phases of the Iron Age are more plentiful ... than for the preceding period ... may be due to a real change in the nature and density of human occupation'. J. D. Hill has gone further and suggested that parts of Kent were included in those areas of south-eastern England that had been of relatively marginal importance for settlement in the middle Iron Age and saw significant expansion of settlement only in the late Iron Age. As he put it, '... large parts of Kent, Hertfordshire and Essex seem to have had relatively little permanent settlement c. 300–100 BC' (Hill 2007, 24). The appearance

of significantly increased levels of settlement activity thereafter is seen as a consequence of relatively radical cultural and social change, although the underlying causes of these changes could themselves be diverse (*ibid.*). The suggestion that a significant expansion of settlement activity does not predate the late Iron Age is certainly consistent with the evidence from projects such as HS1, where at some thirty 'locations' of late Iron Age and/or Roman activity (sites more than c. 500m apart), pottery evidence indicates that a pre-conquest origin is likely at twenty-seven, but only two or three of these also had significant evidence for middle Iron Age occupation (Booth 2011a, 260 – note that most references to HS1 below are in terms of this overview publication; detailed references to individual site and specialist reports, all to be found on the ADS, are also given there). A broadly similar situation prevailed on the East Kent Access (Phase II) road scheme on Thanet. Here a majority of the areas with late Iron Age features also produced evidence of early Roman activity and only a few Roman sites were established in previously unoccupied locations (OWA 2011; Andrews *et al.* 2015). The latter included the chalk ridge forming the northern limit of the project area, where occupation had a similar 2nd–3rd century date range to that of the nearby minor nucleated settlement of Monckton (Bennett *et al.* 2008). By contrast with the HS1 sites, however, a greater proportion of the late Iron Age and early Roman settlements on the East Kent Access route had middle Iron Age (and occasionally earlier) antecedents. This part of the county may have had a longer continuous history of relatively intensive later prehistoric settlement (see *e.g.* Champion 2007, 104–7).

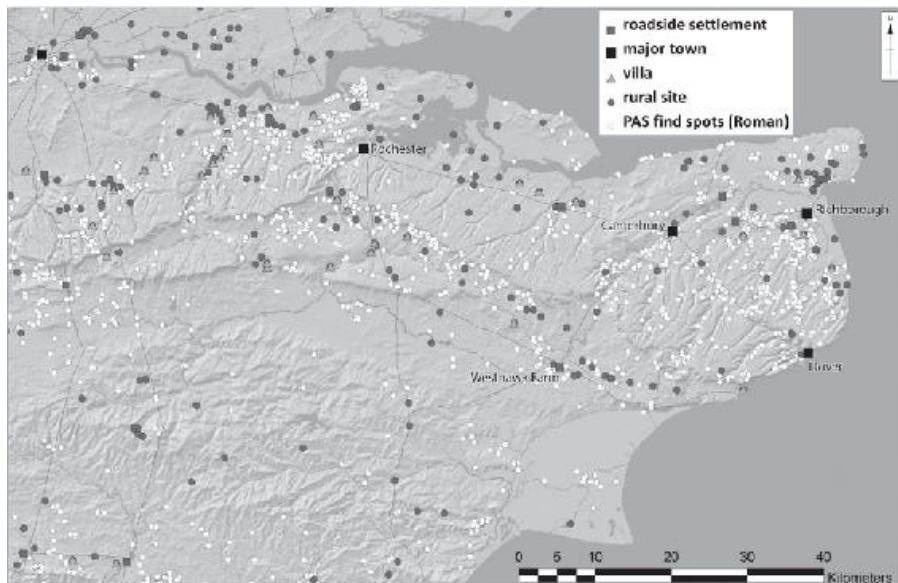


Fig. 4.1: The distribution of sites recorded for the Roman Rural Settlement Project: a partial reflection of relative densities of settlement in Kent (courtesy of Roman Rural Settlement Project).

Despite these differences in earlier background, the evidence of both these substantial linear projects indicates that extensive areas of the landscape of Kent were quite densely settled by the beginning of the Roman period. The time depth of this settlement may have varied across the county, however, and the HS1 pottery evidence mentioned above seems to suggest that the contrast between middle and late Iron Age patterns of activity in this area represents not so much discontinuity of settlement location between the two periods as a significant and perhaps rapid increase in the density of settlement in the later period (Booth 2011a, 262), as discussed above.

Detailed understanding of the physical characteristics of early Roman settlement is still problematic, however. Ditched enclosures are a recurring, although not universal, feature of settlement, as already indicated. Such enclosures were often rectangular or sub-rectangular in form, and ditches could sometimes be substantial, but there was considerable variation in the degree of regularity of plan. Nevertheless, despite the frequency of these features, evidence for structures within enclosures or (perhaps particularly) in unenclosed settlements is much more elusive. For all the intensity of activity in the late Iron Age and early Roman periods on the HS1 sites, only one produced evidence for round houses at this time, and this was Thurnham, which developed into a villa complex and was probably

already a higher status site in the first half of the 1st century AD. Typically, the only structures identified on these sites are four-post structures, of which thirteen examples came from six different late Iron Age-early Roman sites on HS1 (Booth 2011a, 270–4). Such buildings are the only visible structures at further sites of this period, as at Keston, where one six-post and ten four-post structures were assigned to the late Iron Age (Philp *et al.* 1991, 13, 25–9) but there was no indication of circular buildings. At Hillside, Gravesend, a six-post and a four-post structure occupied the same location in the southern part of the site in the early post-conquest period. A further four-post structure and six-post structure located further north were of slightly later date. The latter, c. 5m × 4m, was sufficiently large to have had a function distinct from that of the other buildings (Philp and Chenery 1998, 31–2). At Queen Elizabeth Square, Maidstone, two ‘four-posters’ formed the only late Iron Age/early Roman structural evidence (Booth and Howard-Davis 2003, 5–6, 11) and at Hawkinge, near Folkestone, a relatively recently excavated late Iron Age-early Roman site contained at least a dozen four-post structures and additional larger posthole buildings, but only one possible circular structure, also post-built (House 2005, 1). By contrast, however, the later prehistoric/early Roman settlement in Zone 6 of the East Kent Access Road, at Ebbsfleet, did include circular structures, although these were not found in later phases there (see below).

Within this context the range of structures at Furfield Quarry just south-east of Maidstone is of particular interest (Howell 2014). The site may form part of the wider complex of ‘oppidum’ type perhaps focussed on substantial earthworks at nearby Quarry Wood, Loose (Kelly 1971). Whatever the nature of that relationship may be, the varied structures at Furfield Quarry, including timber aisled buildings and two (?later) stone-founded buildings, associated with rectilinear ditched enclosures, suggest a villa-type complex, although a ‘main house’ is not known at present and other interpretations may be possible. The most remarkable structure is represented by a double row of postholes some 5.5m apart and 31m long associated with the substantial enclosure ditch of the mid-1st–mid-2nd-century phase of the complex, interpreted as a ‘stock-handling structure’ (Howell 2014, 54–6), although it is unclear how this might have functioned.

The absence of evidence for well-defined domestic buildings at the beginning of the Roman period remains a major problem. Possible explanations might include a shift in the dominant structural tradition

towards surface-built structures, whether circular/subcircular and of mass wall construction such as cob, or possibly rectangular and timber-framed (*cf. e.g.* Bird 2000, 159). It is notable that evidence for circular structures continues to be found in the context of some nucleated settlements (see further below), but the significance of this trend is unclear.

The problem of identifying buildings on lower status rural settlement sites generally persists through much of the Roman period, and is by no means unique to Kent (*e.g.* Booth *et al.* 2007, 35–6, 60). Buildings in rural settlement contexts from the mid–later 1st century onwards are much more readily detected on higher status sites. In their developed forms the villas of Kent vary enormously in size, architectural complexity and manifestation of material wealth, as elsewhere. They also seem to exhibit some locally specific characteristics, discussed by Millett (2007, 170), amongst which a general absence of mosaic pavements, even in some of the more substantial establishments such as Darenth, is notable. Depending on the criteria used to define a villa (see *e.g.* the strictures of Detsicas 1983, 100) the overall numbers will vary, but a broad definition is preferred, as in the *Historical Atlas of Kent*, in which 64 examples are identified (Andrews 2004, 21); this will serve as a guide figure, though now augmented by more recent discoveries.

As with other types of rural settlement discussed above, occupation at many villa sites will have had late Iron Age origins. This is particularly clear at Thurnham, where two roundhouses (identified only from their surrounding drainage gullies) probably spanned the conquest period and were then succeeded by a proto-villa building with associated structures of rectilinear form by the early Flavian period, in turn replaced by an expanded complex in the early to mid-2nd century (Lawrence 2006). Other villa sites overlie features which probably relate to immediately preceding settlements (rather than just field systems, for example) even if indications of direct sequences of domestic buildings are rarely as clear as at Thurnham. Examples ranging across the county include Keston – even though the ‘proto-villa’ here is dated as late as AD 160 and the first full villa phase to *c.* AD 200 (Philp *et al.* 1999, 180–94), Faversham (Philp 1968) and Minster in Thanet (*e.g.* Parfitt *et al.* 2008, 311–13). At Eccles, closest of these sites to Thurnham, evidence of late Iron Age activity is limited (Detsicas 1976, 162; *cf.* Detsicas 1983, 120), but the earliest house, dated *c.* AD 65 (or possibly even earlier; Millett 2007,

152), closely contemporary with the proto-villa at Thurnham, was considerably more substantial, consisting of twelve rooms and a corridor (Detsicas 1983, 120). At Folkestone, recent work shows that the superficially well-known villa (Winbolt 1925), of unusually early date, was situated within what had probably been an important centre for importation of goods via northern France (easily visible from the site on a clear day) in the late Iron Age – the assemblages featuring a wide range of continental ceramics (Keith Parfitt pers. comm.). Some villas, however, have produced no evidence for meaningful pre-conquest antecedents or associations of any kind, although relatively comprehensive excavation is required to demonstrate this with certainty. At Northfleet, a substantial timber building was constructed as early as c. AD 70 but was not preceded by any significant activity on this site (Biddulph 2011a, 135–41). The main buildings of the villa complex, on a different alignment, were under construction from about AD 120. At Lullingstone the first house dates to the late 1st century (Meates 1979, 17), but although there is some earlier activity its scale and nature (e.g. *ibid.*, 119; Pollard 1987, 164) are uncertain. A similar situation is likely at Minster in Thanet (Parfitt *et al.* 2008, 332), while Darenth may have been established in the early 2nd century (Detsicas 1983, 107). Overall, however, it is clear that where adequate evidence exists a significant number of villas in Kent were established by the end of the 1st century AD; for example the Rural Settlement Project has identified 13 such sites out of 21 with clear chronological sequences (Allen 2013).

A number, and perhaps a majority, of these sites were associated with ditched (or, occasionally, walled) boundaries, similar to those seen on a variety of other types of site in the late Iron Age and early Roman periods. There are hints that very precisely rectangular enclosures may in some cases be indicative of settlements of higher status, though the necessary evidence is not always available from earlier excavations. One suggestive example, however, was seen in part on the HS1 site of Northumberland Bottom near Gravesend. Here only the southern margin of the enclosure lay within the excavated area and its potential significance was not fully appreciated. Subsequent excavation on the line of the new A2 to the north revealed the northern edge of the enclosure complex. However, while the character of possible buildings within the enclosure remains largely unknown, as its central part remains unexamined (although the fact that hints exist at all is of some significance in view of the limitations of this sort of evidence discussed above), the real indication of the

status of at least some inhabitants of the site comes from a small group of very rich 1st-century burials immediately north of the main enclosure (Allen *et al.* 2012). The largest and earliest of these is remarkable even by the standards of Kent which, as is well known, is unusually well-provided with such evidence. We are reminded that expression of status can take many forms, and investment of resources in ostentatious burial rites seems to have been one way in which this was done across the county. This was, moreover, a tradition with roots at least in the late Iron Age, if not earlier (*e.g.* Champion 2007, 123–7; see now Stevenson 2013). At Northumberland Bottom it is entirely possible that both domestic and funerary structures were used to express status, as is seen clearly in the case of Keston (Philp *et al.* 1999, 45–58). Elsewhere, however, the specific settlement associations of wealthy burials or burial enclosures (*e.g.* Jessup 1959) are not always so clear, or are slightly unexpected, as in the case of the walled cemetery at Springhead (Davies 2001; Andrews *et al.* 2011, 132–4).

Apart from variations in size, and some important differences in chronology as suggested by some of the examples already quoted, the known villa buildings are broadly of well-recognised forms and many show characteristic development sequences, demonstrated by the more recent excavations to be complex, as one might expect. Some individual structures or aspects of structures are particularly notable, however, including the complex courtyard layout at Darenth and the sunken room at Lullingstone (though the latter may be an example of a well-established regional tradition of cellar-like rooms, some at least of which appear to have cultic associations (Perring 1989)). Most remarkable is an octagonal building, probably (but not certainly) a bath-building, at Teynham, near Faversham, a freestanding structure but forming part of a larger building complex (Wilkinson 2011). This building, of 4th-century date, has similarities with exotic structures in south-western England and with a smaller room in the poorly understood villa near Loose, south of Maidstone (Roach Smith 1876).

Very few complete or fairly complete complexes are known, but Keston, Thurnham and Minster in Thanet are examples where there has been widespread systematic investigation. This is seen to a lesser extent at sites such as Lullingstone and Eccles. In many cases, however, particularly those known from antiquarian or small-scale work, the range of associated or ancillary structures is poorly understood, but sites such as Thurnham and Darenth (Philp 1973; 1984) show that such buildings could lie at some distance from the

principal villa enclosure or compound yet still form an integral part of the overall layout of the complex. Only in very few cases has examination extended significantly beyond enclosure features, whether walls or ditches.

Aspects of rural settlement location have been mentioned above, and the pattern of villa distribution is relevant here. Even a superficial glance at the map (e.g. Andrews 2004, 21) makes it clear that the spread of villas is not even across the landscape. At least some of the reasons for this are well known and relate to topography and the location of better quality agricultural soils, but there are likely to be other factors as well. Leaving aside the effects of bias in the location of fieldwork (see above), the concentration of villas in the Faversham/Sittingbourne area is notable (Wilkinson 2000; 2011, 410), as are well-known concentrations in the Darent and Medway valleys. These distributions are not random, but reflect differing patterns of exploitation of the agricultural landscape. It is easy to see how, in the Darent valley for example, the whole countryside could have been divided between the estates attached to these sites. Such room as was left for non-villa sites here may have been assigned to settlements of tenants of these estates, and such sites could have been quite short lived in some cases (e.g. Simmonds *et al.* 2011, 195–6). The geographical logic of such a settlement pattern is fairly clear, even if the social consequences of it are less evident and the nature of an earlier (pre-villa) settlement pattern even more obscure, although it may be noted that elements of a ditched field system just to the east of the Darent valley may have been completely silted up by c. AD 70 (Philp and Chenery 2001; Simmonds *et al.* 2011, 191–3). This suggests a significant change of land use by this time, and while such a change need not necessarily equate to a change of ownership or other forms of tenure it is tempting to see it as possibly related to the early development of the villa estate model in this area.

The fertile north Kent plain is another area where significant concentrations of villa sites have been claimed, particularly as a result of the Swale District survey (Wilkinson 2000). Here a minimum of 18 probable villa sites have been identified in the area between Rochester and Canterbury, and are suggested to be the centres of large estates set within a systematically organised landscape both north and south of Watling Street. The substantial character of some of these sites is not in doubt, but much of the evidence is based on results of surface collection and survey and parts of the interpretative framework placed

upon it are less secure (e.g. Williams 2003, 231). In particular, the suggestion that this territory is entirely divided amongst villa estates, some of which are seen as very substantial indeed, appears optimistic and takes no account of the nature of other settlement types that may have existed within this landscape.

Different villa distribution patterns are seen further east. In Thanet as many as 17 certain or potential villa sites have been suggested (Perkins 2001) alongside a variety of other settlement evidence (and other indications of as yet unlocated settlements in the form of cemeteries – a type of evidence with which Kent is particularly well-endowed). It has been suggested that these may be ‘mostly farms that cannot really be called villas’ (Millett 2007, 170), echoing a point made by Detsicas (1983, 100) about the huge differences of scale of sites falling within this umbrella term, but in a number of cases the evidence is as insufficient to substantiate a dismissive view as it is to demonstrate particularly wealthy complexes. Perhaps more to the point is the basic fact of demonstration of a degree of architectural pretension (and systematic planning, as suggested for example at Minster in Thanet (Jones 2014)) reflected in the use of romanised building materials and techniques, regardless of scale. Such sites are distinct from what is likely to have been the large majority of rural settlements. It is worth noting, however, that the occurrence of brick and tile has to be interpreted carefully, particularly when the quantities are small, as it is clear that such material was extensively recycled for use in structures such as hearths and ovens on sites which in some cases clearly never had buildings with tiled roofs.

Concentrations of villas may reflect important characteristics of society as well as environmentally determined aspects, the latter demonstrated at the broadest level by the Wealden part of the county, where villas are effectively absent, though other settlement forms of course are not. A more nuanced approach, however, is needed in those areas where the likely environmental contrasts are less stark than, say, that between the Weald and the fertile soils of parts of the north Kent plain (e.g. Young 2004, 2). The area around Canterbury is apparently one that is relatively devoid of villas, for reasons which remain unclear (e.g. Millett 2007, 170). These seem unlikely to relate to the agricultural potential of the land, however, and are rather more likely to reflect social factors connected with the character of the *civitas* capital, though detailed definition of these factors remains a challenge; villas are certainly not completely absent from this area, as

is shown by recent work at Bishopsbourne (Wallace *et al.* 2014).

Martin Millett has suggested that for north Kent, at least, distinct social groupings based around river valley communities in the late Iron Age were probably a key factor in the subsequent development of Romano-British settlement patterns and sees aspects of villa distribution reflecting this (Millett 2007, 148, 153). This is an attractive idea, but it would need much more work on the development of all aspects of rural settlement in these areas for it to be substantiated.

If the villas represent the estate centres of the major landowning families of the region, a point which they presumably had in common with the large number of lower status farmsteads was the need for access to local centres which had a variety of roles, perhaps in relation to local administration but certainly in terms of provision of market facilities and also as religious foci of local or, in some cases, wider importance. There is no room here to discuss in detail the evidence for these sites in Kent, but they cannot be completely ignored. Most of them probably developed in the aftermath of the imposition of the major road network, although one significant exception is Springhead, where the important religious complex expanded through the early Roman period, stimulated, but probably not initiated, by the siting of Watling Street. It developed from a later Iron Age focus, perhaps, but less clearly, also primarily religious in character, as shown particularly by recent work in advance of the construction of HS1 (Andrews *et al.* 2011). Hersden, north-east of Canterbury, might also have its origins in the late Iron Age (Barrett 2004; Bennett *et al.* 2010, 336–7).

The origins of some of the other sites in this category are less clear, although Ospringe and perhaps Dartford and Crayford are likely to owe their existence specifically to the imposition of Watling Street, and therefore to be foundations entirely of the Roman period, in contrast to Springhead. This situation is more clearly demonstrated at relatively extensively excavated sites of variable size and character, but of nucleated aspect. Such sites include Westhawk Farm at Ashford, Ickham, north-east of Canterbury, and Monkton on Thanet, the last of these perhaps not developing before the 2nd century at the earliest, whereas at Westhawk Farm occupation appears to have been established at the junction of roads from Canterbury and Lympne within a decade or two of AD 43.

These sites varied considerably in extent, morphology and complexity of sequence. In terms of their function within local

settlement networks the religious emphasis at Springhead was of overriding importance, as has been well known for many years (for a concise summary, Detsicas 1983, 60–76) but brought into even sharper focus by the more recent work (Andrews *et al.* 2011). The existence of roadside shrines of more modest scale and sometimes unconventional form was, however, also a feature at Westhawk Farm (Booth 2001; Booth *et al.* 2008) and Monkton (Hicks 2008, 102, 107). Such shrines would have been important for the occupants of these settlements, but their roadside locations suggest that they probably served wider communities as well. Only at Springhead, however, is it at all likely that activity related to the various shrines formed the economic basis for the lives of the inhabitants of the site. At Westhawk Farm and Monkton a primary emphasis on aspects of agricultural production and related marketing and service provision seems likely (see further below); the situation at Ickham is less clear and elsewhere the evidence is insufficient to allow comment. A further minor roadside settlement may have existed at Maidstone, but its status is still unclear (e.g. Booth 2011a, 257; O'Shea and Weekes 2014, 149–50).

One feature of the lesser nucleated settlements is the fact that they produce much of the best structural evidence for rural and rural-related settlement away from the main villa sites. At Springhead the range of structural types apart from the obvious temple buildings is now considerable, and perhaps brings this site closest in character to upper echelon settlements. At Ickham the best known structural evidence relates to specialist milling functions, and the balance of economic evidence here, unusually for such settlements in Kent, lies in the late Roman period (Bennett *et al.* 2010). Monkton is almost equally well-known, in this case for its remarkable group of 23 sunken-featured structures cut into the chalk (Hicks 2008, 107–50) and arranged along the line of the road which formed the axis of the settlement. Once thought to be unique, it is now clear that these are examples of a regional building type, but one much better attested in Thanet than elsewhere (although outlying examples are known, for example at Northumberland Bottom near Gravesend (HS1), in adjacent parts of the A2 site examined more recently (Booth 2011a; Allen *et al.* 2012, 404, 414–15) and at Springhead (Andrews *et al.* 2011, 112, 128, 131)). Further examples of these buildings have been recorded in recent excavations in Monkton village (Vince Gardiner, pers. comm.) and during work on the East Kent Access (Phase II) in Thanet, in the latter case both in 2nd–3rd-century settlement on the

Chalk ridge at Thorne Hill quite close to Monkton and on a lower-lying site at the head of the Ebbsfleet peninsula. This last site was notable for a distinct change in domestic architecture, from roundhouses defined by ring gullies in the late Iron Age phase to sunken-featured structures in the early Roman period (Andrews *et al.* 2015). At Westhawk Farm, by contrast, circular buildings were current throughout the life of the excavated part of the roadside settlement, that is from the early Roman period until about the middle of the 3rd century AD (Booth *et al.* 2008). Here ten such structures, not necessarily all domestic buildings, were identified, entirely or in part, on the basis of the existence of gullies, most if not all of which are likely to have been for drainage around the structure rather than being wall trenches. The internal diameters of the gullies or segments thereof ranged from c. 7m to c. 12m. In one case arcs of stakeholes survived at three points around the perimeter of the structure and suggested the position of the wall line of a building of c. 10m diameter, with the wall set very close to the associated drainage gully.

The best evidence for circular buildings of early Roman date in the region therefore comes from the larger nucleated settlements, including a further example from Springhead (Andrews *et al.* 2011, 39–41). It is uncertain if the better survival sometimes found in these contexts provides a reliable guide to the nature of structures, although this was the case at Springhead (*ibid.*, 40–1). Were the majority in fact of stake and wattle and daub construction, or was cob or some other mass-walling technique widely used in this period, as has been suggested for example for the Upper Thames Valley (Allen *et al.* 1984), perhaps particularly in rural contexts? As a structural medium, cob would leave no below-ground traces. It seems unlikely, however, that preservation factors alone explain the occurrence of these buildings at Westhawk Farm (where preservation conditions were mostly poor and typical of rural contexts) while they are apparently absent from contemporary farmsteads. As with Monkton and the adjacent Ebbsfleet site, however, it is clear that there was extensive overlap in structural types between nucleated and other settlement forms. The recent Springhead excavations have revealed a remarkable diversity of structural types in stone as well as in (presumably) timber, the latter perhaps indicative of buildings which might have occurred in strictly rural settlement contexts. Equally, while rectilinear timber buildings were relatively scarce at Westhawk Farm, the site did contain simple posthole and beam-slot buildings, also seen at Springhead, and one example of a larger and more distinctive posthole

building type. Other examples of the latter have been recovered at villa sites such as Keston and Thurnham and on a further HS1 site at Bower Road, Smeeth, of uncertain character but possibly forming part of another villa complex, the main focus of which lay outside the HS1 area (see Booth 2011a, 275–9).

Economic activity

Understanding of the agricultural economy of Roman Kent is still underdeveloped, in part a legacy of the historical emphasis on the examination of villa houses. Systematic sampling for environmental remains of various kinds has been a relatively recent development. A further problem is that for some parts of the county soil conditions are inimical to the preservation of bone, and in such areas evidence for animal husbandry is therefore at best limited (see Booth 2011a, 296–7 for HS1), and at worst effectively completely absent (*e.g.* Charles 2008 for Westhawk Farm). Even in those areas with reasonable bone preservation, large published assemblages are still very rare - the size of the collections at Springhead (Grimm and Worley 2011, 15–42) appears exceptional. Unsurprisingly, however, the composition of this assemblage does not necessarily give a direct reflection of the flocks and herds seen in the countryside. Apart from the occurrence of animals in ritual deposits (with a preponderance of dogs and perhaps also sheep in these contexts) overall numbers of cattle and sheep are roughly similar (by NISP), with cattle perhaps becoming slightly more numerous in the later Roman period, although by other measures sheep may have been more numerous. In terms of meat consumption, however, cattle would have been much more important. Prime age animals of all of the main domestic species were present in the roadside settlement assemblage and are assumed to represent stock brought into the settlement from surrounding rural sites. This pattern may have prevailed at other nucleated settlements, such as Ickham (although based on a small sample; Palmer and Powell 2010, 318), but in the smaller ones, such as Monkton, assemblages are as likely to reflect stock raising operating from within the settlement itself. Again sheep were more numerous, and the importance of their husbandry may have been reflected in the deliberate placement of sheep skeletons in some of the structures. Nevertheless, cattle were again probably more important in terms of their contribution to the meat diet (Bendrey 2008, 259–60). Unusually, horse was the third most important domestic species (though not, of course, in terms of meat consumption), rather than pig, as is more typical, but the same pattern

was also noted at Ickham (Palmer and Powell 2010, 311).

The evidence for ages of animals at death provides some indication of husbandry practices at the rural sites, but the often small data sets only allow quite generalised interpretation. The largest assemblages from consumer sites (like Springhead) do not necessarily reflect the composition of flocks and herds in the countryside. The fact that this can be recognised, however, at least indicates that rural production was typically above subsistence level and that animals were being raised specifically for movement to (and perhaps consumption in) local markets. What proportion of flocks and herds was accounted for in this way is another question; to what extent was there specialised production beyond the recognition that different terrains favoured sheep or cattle? Overall, animal exploitation, particularly in the smaller rural sites, is likely to have involved mixed strategies, with cattle used for traction and dairy and meat products. On the HS1 sites as in the larger settlements discussed above it is likely that cattle provided the majority of meat because of their much greater body mass, even when, as for example at Thurnham, they were less numerous than sheep. Other secondary products of cattle could have included leather, bone and horn, and evidence of horn removal, presumably for working, was found at Northumberland Bottom, Thurnham and Bower Road amongst the HS1 sites (Booth 2011a, 297).

As with stock raising, there are indications of both generalised and specialist production in arable agriculture. Here, however, the evidence consists not just of the physical remains of the crops themselves (discussion here will be confined to the principal cereal crops), but also of structures used in processing and storage. Where preservation of remains is sufficient to allow identification, it is clear that in broad terms the main cereal crops grown were spelt wheat and to a lesser extent hulled barley, in line with the wider picture in southern Britain (*e.g.* Greig 1991; van der Veen and O'Connor 1998; Campbell 2000; van der Veen *et al.* 2007), but in Kent, as probably elsewhere, there was spatial and perhaps also temporal variation within the general pattern. In the HS1 sites emmer wheat was generally rare in the main assemblages, having been more common in the earlier Iron Age, although larger quantities were recorded at Saltwood Tunnel. Elsewhere, significant quantities of emmer were noted in a 1st-century pit from the sanctuary at Springhead (Stevens 2011, 97), but at Wingfield Bank, barely 300m distant to the east, in

contrast, chaff deposits from a late Iron Age oven were dominated by spelt (Wheaton *et al.* 2015). Almost equal proportions of emmer and spelt were recorded in a late Iron Age pit at Wilmington, near Dartford (Hillman 1982), and at Queen Elizabeth Square, Maidstone emmer may have been sufficiently common to be considered as more than an impurity in the spelt crop in the early Roman period (Pelling 2003, 22; but see also Pelling 2011, 273).

Evidence for free-threshing wheat species (as opposed to the hulled wheat species spelt and emmer) is recovered occasionally, but is never common in this period. Such grains were recorded at the HS1 sites of Pepper Hill, Northumberland Bottom, Thurnham, Little Stock Farm, Bower Road and Saltwood Tunnel and have also been noted at Springhead (Campbell 1998). Oats occur commonly, but again only in small quantities, and in general could as easily have been from wild as from cultivated plants, although even in this form they could still have been used to supplement other grains, as was possibly also the case with some of the larger wild grasses.

The HS1 evidence suggests that there was little significant variation in the range of cereals represented at each site with the passage of time, although there was considerably less evidence for the late Roman period than for the first two centuries AD, so the nature of any developing late Roman trends cannot be judged from this evidence. Overall, spelt appears as the principal cereal on most sites (in cases where imperfect preservation does not allow a distinction to be made between emmer and spelt there is generally a presumption that the latter is mainly represented), and in some key assemblages seems to dominate completely. Sites where this is the case include villas such as The Mount, Maidstone (Robinson 1999, 149) and Northfleet (Smith 2011); such occurrences are perhaps more likely to suggest specialised production for uses beyond the parent farmstead than the mixed deposits encountered on many sites, and may therefore correlate with aspects of site status, although the processes involved in the composition of the recorded samples are potentially complex and interpretation of those processes therefore typically not straightforward.

Variation in the evidence for storage capacity sheds some light on this issue, although again the picture is far from complete and does not necessarily permit wide generalisation. The relative ubiquity of four-post structures, particularly in the late Iron Age and early Roman period, has been noted above. The evidence that these definitely

served as grain stores is still limited, but received at least some support from the HS1 site of Leda Cottages (Booth 2011a, 270). The size of these structures suggests cereal production broadly at subsistence level; the presence of multiple examples on some sites (as for example at Keston) may indicate larger-scale production, but does not prove it. There is, however, striking evidence for grain storage on an altogether larger scale from a number of villa sites. Buildings at Horton Kirby (Philp and Mills 1991) and Lullingstone (Meates 1979, 111–19) both had structural characteristics (raised floor supports) related to those of granaries on military sites. The Horton Kirby building may have been constructed in or after the later 2nd century (see Bird 1991 table 7 deposit 5) and its capacity was subsequently expanded, while the Lullingstone granary was assigned to the later 3rd century (Meates 1979, 116). Other substantial buildings or parts of buildings in villa and perhaps other complexes will also have served as granaries, but lack the direct evidence of distinct structural form or of substantial deposits of plant remains which would clarify the issue. Both the east and west aisled structures at Northfleet, for example, contained indications of use as malt-houses in connection with the large-scale production of malt for which there was other evidence on site (Biddulph 2011a, 217; Smith 2011), but there can be no certainty that this was the exclusive function of these buildings in any phase of the use of the site. Nevertheless, the scale of the malting operation, indicated by charred remains of germinated grain associated with a kiln located between the two aisled buildings, suggests specialisation in the production of ale. Malting has also been identified at a number of locations within the nearby Springhead settlement (Stevens *et al.* 2011), which together with the Northfleet evidence indicate a remarkable concentration of this activity in the area. The fact that the Northfleet villa had its own waterfront giving access to the Thames estuary might suggest that some of the bulk product was transported by sea, in turn indicating a particularly intensively organised operation with extra-local markets.

Charred cereal evidence for malting is encountered elsewhere in Kent, including on some of HS1 sites, such as Thurnham in the early Roman period, but the quantities involved are nowhere near comparable with the evidence from Springhead and Northfleet. South-east of Canterbury at Nonington, however, recent work has produced evidence for a possible store building, perhaps of slightly sunken form, containing an extensive deposit of malted spelt (Helm and Carruthers 2011). This represents much more than just a casual activity; the

overall scale of malting is substantial (*ibid.*, 369; although the absolute quantities and examined sample sizes are not quoted). It is notable that the chronological emphasis at Nonington is in the early Roman period, with relatively little evidence for activity after the mid-2nd century. Further probable evidence of malting, this time of 2nd–3rd-century date, comes from relatively nearby at Walmer (Pelling 2010, 74–5).

Heating sprouted grain to arrest the process was one of a number of functions of ‘corn-drying ovens’. These structures, of varying size and complexity of plan, are widespread in the countryside (and in some nucleated settlements), occurring in both villa and non-villa contexts, and along with other aspects of the record attest to intensification of arable production across the region. As elsewhere in Britain, these structures seem to be most common in the middle and later Roman period, but their chronology requires more work.

Rural settlements also embraced a range of non-agricultural activities such as metal production and working, pottery manufacture and salt making. The problem with all of these activities is to determine the extent to which, if at all, they were fundamental to the economies of individual sites or communities. There were certainly areas of Kent where each of these industries was of major importance, but they might also occur elsewhere, at scales suggestive of occasional activity, whether to provide additional income or simply to satisfy the requirements of the home community.

Iron production in the vale of Holmesdale is one example of this kind of activity. Evidence for this can consist simply of tap- and other related slags, as seen at Thurnham, but at the HS1 sites of Leda Cottages and Beechbrook Wood, as well as at Runham’s Farm, Lenham (Philp 1994) furnaces were also found; at Leda Cottages and Beechbrook Wood different furnaces were used for smelting and for primary working of blooms. At these two sites smelting was confined to the late Iron Age-early Roman period, and the overall scale of production at all of these sites is likely to have been modest, but the indications of spatial organisation, particularly at Beechbrook Wood, indicate more than casual activity, and iron production may have constituted at least a useful supplement to other income – if that is an appropriate way of looking at it. At Westhawk Farm careful organisation of iron production is also indicated, and may have taken place at a number of locations within the settlement in addition to the two excavated ones (Paynter 2008, 294). Nevertheless, the scale of

production is still minor when compared with the output of the main Wealden sites (e.g. Hodgkinson 1999; 2008; this volume). These fall outside the scope of this discussion, but a question that remains important is that of the relationship of minor production centres, and indeed of other rural settlements close to the major production sites, to those principal centres – were they bound in to the same networks of production and distribution, and servicing of the principal centres, or did they operate within different frameworks? A possible administrative link between Westhawk Farm and the Wealden iron-producing sites to the south-west has been proposed, but is speculative (Booth *et al.* 2008, 390). A little further north-east, at Furfield Quarry, evidence for a bloomery (as well as possible indications of pottery production) (Howell 2014, 46–50) raises the question of connections between ‘industrial’ production and foci of higher status occupation, here in the context of the Loose ‘oppidum’.

Pottery production, like that of iron, occurred at several different scales and illustrates an interesting range of associations with rural settlement. Widespread production at a local level in the late Iron Age and early Roman periods is likely, although this tends to be indicated by localised fabric and form distributions (e.g. Pollard 1988, 33) rather than by excavated kiln structures. Such evidence comes again from HS1, where production in a grog-tempered tradition is indicated at Beechbrook Wood in the late Iron Age and perhaps into the early Roman period, and in a glauconite-tempering tradition at Snarkhurst Wood in the late Iron Age (and perhaps at Furfield Quarry – see above). Another very distinctive local tradition, this time exploiting Kentish rag as a tempering agent, has been identified at Leybourne Grange, near Maidstone (Biddulph 2011b). Other local grog-tempering traditions, longer-lasting than that identified at Beechbrook Wood, were probably widely-distributed across the county. These productions were all concerned with non-specialist domestic pottery. By contrast, pottery production at Eccles, presumably carried out within the framework of the villa estate, may have been of short duration and with its emphasis on flagons and some unusual vessel types was perhaps undertaken for a very specific and essentially non-local market. Tile production here was rather longer lived and the distribution of its products rather wider than that of the pottery (for the latter e.g. Pollard 1988, 188–9; *cf.* Betts, this volume), though apparently still not particularly extensive.

There were at least three other industries operating on a larger

scale. Amongst these the Canterbury industry, probably established in the later 1st century AD, developed in an urban context and is not considered further here. The so-called Patch Grove industry of west Kent is poorly understood, but its production, particularly of characteristic large jars, was on a distinctly different scale from that of potters working in other local grog-tempering traditions in the early Roman period (Pollard 1988, 39). Different again in scale was production in the northern littoral of the county, although viewing this as a single 'industrial' area is clearly misleading as production here involved potters working in a number of quite different ceramic traditions, with differing chronological ranges and volumes of output (Monaghan 1987). While some of these indicate productions of only local significance, shell-tempered wares possibly had a specific function (see below), fine Upchurch reduced wares were regionally important and vessels in the black-burnished ware (BB2) tradition had a wider east coast distribution, as is well known.

The least well-defined rural industry is salt-production (see also Biddulph, this volume). In the Romney Marsh area there is some evidence for production at Dymchurch, Lydd and Ruckinge (Cunliffe 1988) and Scotney Court (Barber 1998), but its scale is not very clear. In some cases, at least, this evidence appears to be associated with that for domestic activity. It is notable, however, that production seems to be confined to the 1st and 2nd centuries. This is the date range of a chaff-tempered briquetage fabric (Macpherson-Grant 1980; Barford 1982) not assigned to a specific source by Barford (1995), but for which both north and south Kent origins have been suggested (*e.g.* Morris 2001, 391; Lyne 2006). This fabric was widespread on HS1 sites, but only in very small quantities. It is notable, however, that organic-tempered briquetage was only a small component of the 1st-century assemblage from Scotney Court, the majority of the briquetage here being in flint-tempered and grog-tempered fabrics (Barber 1998, 339–41). Salt production in the north Kent marshes seems likely to have been considerably more substantial in scale, but understanding of this industry is limited because of the physical difficulties of recovery of basic evidence (an issue which has also affected work on some aspects of pottery production here – *e.g.* Monaghan 1987, 14–16), a consequence of the original location of some sites in the intertidal zones and loss through subsequent erosion and rising sea levels (*e.g.* Monaghan 1987, 14). Nevertheless, salt production was widespread (Miles 1975) and locally very intensive, as at Broomhey Farm, Cooling (Miles 2004), where it was closely

associated with pottery production, both activities apparently continuing into the 3rd century. Interestingly, however, some of the most useful recent evidence has come from work inland. Heavily organic-tempered briquetage has been recovered from sites of late Iron Age and early Roman date in the Dartford area west of Springhead (Poole in Simmonds *et al.* 2011, 139; 232, 265), at Springhead itself (Poole 2011, 323) and from the A2 east of Springhead (Morris 2012), although it may be significant that briquetage from Northfleet villa did not suggest salt-working there (Poole 2011, 343). The character and quantities of material at these sites suggest secondary stages of production (away from the primary sources of brine) rather than just transport to consumer sites, continuing a pattern that is also seen in this area earlier in the Iron Age (e.g. Morris 2006). Different salt production centres had different means of distribution, and while Droitwich salt, for example, was distributed in briquetage containers, this was not necessarily the case in other industries. In the case of north Kent, the use of other types of container for long distance transport seems likely, and it is possible that shell-tempered jars served this purpose (e.g. Green 1980, 65; Perring and Brigham 2000, 154). This ceramic tradition was found on both sides of the Thames estuary, like evidence for salt production itself, and like the majority of that evidence is essentially of early Roman date. As noted above, however, salt production at Cooling may have continued into the 3rd century, and from the Essex side of the Thames estuary there is evidence for late Roman production at sites such as London Gateway (Biddulph *et al.* 2012). It is possible that here, and perhaps therefore also in north Kent, major changes in the technology of salt production resulted in abandonment of the use of briquetage, the most readily visible form of evidence for salt manufacture, in line with developments in other salt production centres in Britain, as for example at Droitwich (e.g. Hurst 1997, 149), but not, for example, in some fenland sites (e.g. Lane and Morris 2001, 192). A further (highly speculative) suggestion is that the possible role of shell-tempered vessels as salt transport containers was taken over by BB2 jars from the early 2nd century. In any case, it seems highly likely that aspects of ceramic and salt production were closely integrated, even if the nature of the evidence does not allow definition of the detail of this. Moreover, the evidence for a stage of inland salt-working, if correctly understood, suggests a further level of integration within areas with more traditional agricultural concerns, at least in the early Roman period.

The big issues

The rural landscapes of Kent in the Roman period show considerable diversity of settlement type and density as well as including areas with concentrations of non-agricultural activity of several distinct kinds. Diversity is conditioned in part, as in any region (but perhaps more markedly here than in some), by the underlying geology and the resulting variety of topographies (including, critically, coastal topography) and soil types. Other factors related to the character of society also played their part, and there are other major trends in rural settlement which seem to lie beyond these factors.

The first and most obvious of these overarching trends is chronological. A cursory examination of the chronological range of the various HS1 rural sites (Fig. 4.2) shows that almost all of these were occupied in the early Roman period, but that from the 3rd century onwards the scale of activity was significantly reduced, and a substantial number of these sites were simply abandoned by the second half of the 3rd century. This very striking pattern has been considered at some length recently (Booth 2011a, 334–7), including discussion of selected evidence from other parts of the county (see also Fulford and Allen, this volume). This will not be repeated in detail here, but in summary it is clear that a broad pattern of abandonment or at least reduction in intensity of activity can be observed in rural settlement across the county, in areas as diverse as the Weald and its margins (e.g. Cleere and Crossley 1985, 84–5; Aldridge 1998, 7; Aldridge 2001, 155), the Maidstone area (e.g. Booth and Howard-Davis 2003) and Dartford (e.g. Booth 2011b, 281–2) in the west, Thanet in the east (e.g. Perkins 2001, 46; Andrews *et al.* 2015) and even in parts of the agricultural heartland of the north Kent plain (e.g. Savage 2006, 366; Clark *et al.* 2009, 73). The pattern is of course not a simple one – abandonment is not synchronous (although some groups of sites may have similar date ranges) even within the broad limits of the chronology of the pottery which in many places is the only dating medium. It is, however, fairly clear that settlement abandonment is not compensated for by corresponding cycles of establishment of new or ‘replacement’ sites, nor by substantial expansion of nucleated settlements. Indeed, some of the latter appear to be involved in comparable patterns of (particularly) 3rd-century decline, noted especially at Westhawk Farm (Booth *et al.* 2008, 394–6), but also for example at Springhead (e.g. Andrews *et al.* 2011, 247–8). Identification of what still seems to this writer to be a remarkable phenomenon is much easier than its interpretation. First, however,

more work is needed on establishment and refinement of local patterns of settlement abandonment; what is their exact chronology, is this sub-regionally variable, and are there further patterns in terms of which types of sites are affected and which not?



Fig. 4.2: Chronology (based on pottery) of sites along the line of HS1 Section 1 in Kent (Oxford-Wessex Archaeology, as Booth 2011a, fig. 5.6).

How can we characterise the late Roman rural settlement of Kent, say from the early 4th century? To start with a sample of HS1 sites, of 14 such sites lying on or below the scarp edge of the North Downs (*i.e.* mainly in the vale of Holmesdale/Chartlands zone), only three have fairly clear evidence of 4th-century activity. The exact nature of this activity at Saltwood is unclear, but a key feature of this site was the presence of trackways indicative of more than purely local communications networks. Both Bower Road and Thurnham were broadly villa-type settlements, although nothing is known of the likely settlement focus at Bower Road. At Thurnham, however, the main house was now out of use, except for one room which was used as a smithy, and the emphasis of the site seems to have been strongly agricultural, with only residual high status elements (Booth 2011a, 290). Nevertheless, it is notable that the nearby lower status HS1 sites had disappeared altogether, while the roadside settlement at Westhawk Farm had shrunk drastically.

Further west in the Maidstone area the visible 4th-century sites are again largely those of higher status character – the villas at The Mount, for example, and particularly Eccles, as well as (presumably)

the building near Loose (but not the complex at Furfield Quarry). The enclosures and linear boundary complexes of Queen Elizabeth Square, Leybourne and Leybourne Grange (see above) are long gone. At The Mount, however, occupation only extended into the early 4th century (Houliston 1999, 100), while at the villa at Snodland 4th-century activity was represented by little more than a few 4th-century coins (e.g. Ocock and Syddell 1967, 192–3, 216–17).

In Thanet only one of the East Kent Access sites, at Ebbsfleet, is likely to have seen significant occupation into the 4th century, although apparently on an increasingly reduced level (Andrews *et al.* 2015). Of the 21 sites in Perkins' (2001) gazetteer of Roman Thanet with dating evidence only two have fairly clear later Roman evidence, one a cemetery and the other possibly related to harbour installations at Ramsgate. More recent work at Minster in Thanet villa has produced 4th-century evidence, but it is not clear if the late Roman fills of a substantial corn drier were closely contemporary with its final use or represented unassociated later accumulations (Moody 2010) from a separate phase of activity only indirectly connected with the main villa, which had been 'largely abandoned by the end of the third century' (Holman and Parfitt 2005, 210). At nearby Monkton there was also a little 4th-century activity, possibly suggesting the existence of late Roman occupation north-east of the excavated settlement (Hicks 2008, 273). Elsewhere, scattered finds are indicative of late Roman activity (e.g. Andrews *et al.* 2009, 118) but its nature remains unclear.

The most consistent evidence of late Roman rural settlement survival is related to the villa sites of north and north-west Kent, although not all sites of this type in these areas were necessarily occupied in the 4th century and many of the potential sites identified between Rochester and Canterbury are known only from poorly-dated surface finds. Overall the indications from key areas of the county are that higher status rural sites more consistently show evidence of late Roman (and particularly 4th-century) activity than do other types of rural settlement. In some areas it is possible that this pattern simply results at least in part from the focus of archaeological attention on villa sites. In the HS1 sample, however, this is clearly not the case, and here the disproportionate concentration of late Roman activity in the higher status sites (particularly Thurnham and Bower Road) is clear, although it is uncertain how far this particular sample can be considered representative of the county as a whole. Taken at face

value, however, a simplistic interpretation would be that the widespread demise of early and middle Roman lower status settlements reflects the growth of villa estates to a level of almost total dominance of the landscape. The obvious problem with this interpretation is that while it may contain more than a degree of truth in terms of landholding (an extremely important but archaeologically intangible question) it does not explain the disappearance of a rural population. Even if estates became systematically enlarged and centralised, there would have been little advantage in concentrating the labour force almost exclusively in those centres, nor is there evidence to suggest that this is what did happen. The problem remains a large one. Perhaps, however, we are seeing, for reasons which are obscure, a reversal of the late Iron Age trend, and a reversion, in parts of the county at least, to the pattern of low density settlement which seems to have been characteristic of the middle Iron Age, as discussed earlier. Consideration of the mechanisms that might explain this cycle requires much further work. In a sense, this may prefigure the situation that affected large parts of Britain in the 5th and 6th centuries – *i.e.* a substantial decrease in population density. It is because this appears to be happening well within the Roman period and therefore is unlikely to be explicable in terms of the factors that follow from the collapse of Roman political and economic systems, to say nothing of the impact of barbarian immigrants, that the phenomenon seems remarkable.

A wider view may help; certainly there are interesting points of comparison between some of the developments in patterns of settlement chronology and changing site character and developments in northern Gaul. The comparisons are not necessarily straightforward, as a recent review by Esmonde Cleary has shown (Esmonde Cleary 2013, 271–82; *cf.* e.g. Van Ossel and Ouzoulias 2000; Louis 2004). Particularly strong similarities in the chronological profile of settlement density discussed above are seen for example in parts of Flanders (*e.g.* De Clercq 2011, 239). The relatively extreme environmental background of that region (generally unsuited for arable agriculture) and a potentially close correlation of its economic development with military supply do not appear, however, to parallel the situation in Kent so closely. Such broad macro-regional trends in settlement development that may have existed will always have seen variation consequent upon specific local social, economic and perhaps political factors. Identification of the particular causes of the variations observed in our case is still to be achieved, but comparison

with adjacent regions which show some of the same characteristics may suggest useful lines of enquiry.

Conclusions

The modern county of Kent offers a diverse range of evidence for rural settlement, but despite the scale of a number of recent projects (of which the majority, with the exception of the central sections of HS1, are on chalk geology) a sense of organisation of landscapes is still elusive. In the 1st century an apparently densely occupied landscape was characterised by farmsteads, many of which were enclosed, with a smaller number of possibly more nucleated sites, though we still know relatively little of the kind of settlement that might have been associated with sub-regional centres such as Quarry Wood, Loose. A degree of status differentiation within settlements is already apparent in the 1st century, and may be indicated by the character of enclosures, but perhaps most markedly in this period in burials. By the Flavian period, however, a number of sites were distinguished by architecture that was radically different in character from what had been seen before, even if the scale of the new buildings was not necessarily vastly different from that of their predecessors. Most (but not all) of these early villas seem to have developed on sites already occupied in the late Iron Age, although this is not very clear in the case of the most spectacular of the early sites, at Eccles. The 2nd century saw a considerable increase in the number of villas, presumably the manifestations of estates of various sizes, though the extent to which the latter also developed from pre-conquest holdings or were a development of the new world order is unclear (for a hint of some of the complexities of land ownership by the early 2nd century see Tomlin 1996). These formed part of landscapes articulated by a road system supporting a range of local centres with a variety of roles, of which a religious function is one of the most consistently occurring, and of primary importance in the case of Springhead. By the later 2nd century the smaller farmsteads are a much less clearly recognised element of the landscape, and by the middle of the 3rd century are hardly visible at all in the record for some parts of the county. A number of the nucleated settlements also have significant evidence for decline by this period, and not all necessarily survived into the 4th century with any meaning as local centres. The clearest evidence for 4th-century rural settlement seems to come disproportionately from villas, particularly in the north and west of the county, although the extent to which these can be considered the dominant settlement type

at this time is still arguable. If this is the case, however, it suggests at least localised depletion of the rural population, particularly in areas where villas are not common and other types of settlement had apparently largely disappeared. Such decline also seems to have affected those areas with economically specialised landscapes – those concerned with the production of iron, pottery and salt.

Such an over-simplified characterisation of rural development begs many questions, but there are plenty of real questions that require much more work.

Chronology is key, not just in the late Roman period, but in refining understanding of the rate of disappearance of settlements as early as the 2nd century. Was this process part of a natural cycle of settlement abandonment and renewal, or does it indicate relocation of population into villa or other nucleated centres, or does it suggest a real reduction in population levels? Significant changes in the nature of rural communities seem to be implied, but did they follow from developments in rural economy, from wider changes in society, or from an intimate combination of such factors? To what extent did villa estates really dominate parts of the landscape, particularly in the north of the county – have we looked hard enough for other less tangible settlement components in these areas? We need to know much more about the physical characteristics of lower status settlements, particularly their buildings – why are the houses so difficult to find? – while we also need to know much more about the range of ancillary structures and functions within villa complexes. How far rural landscapes were really integrated in social and economic terms also remains to be considered in detail – did the specialist production landscapes link readily into wider patterns, or were they occupied by distinct and relatively self-contained communities? How far can any of these productions, and that of agricultural surpluses too, be considered economically proactive, or were they essentially driven by the need to pay taxes and the other requirements of a command economy, and were there direct consequences for and influences upon the form and character of rural settlement as a result of such requirements. These questions ultimately take us well beyond the regionally specific, but consideration of how such issues may have been addressed in Kent may in turn feed into very interesting debates about regional variation in Roman Britain.

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Chapter 5

Rural Settlement in Roman Sussex

David Rudling

Introduction

The Roman occupation of Britain resulted in dramatic alterations in the social and economic environments. The results of these changes, together with other major developments in technology, make the Roman period one of the most dynamic and distinctive episodes in the history of this island. In this paper I will examine the nature of Roman-period rural settlement in Sussex (Fig. 5.1) and consider some of the impacts of Rome on both the landscape and the indigenous population. The observations and case-studies that I have selected are aimed to complement and update previous reviews that I have published (Rudling 1979; 1982a; 1998; 1999; 2003a). The reader's attention is also drawn to a number of other general reviews of Roman-period Sussex: Winbolt (1935), Cunliffe (1973) and Russell (2006). In addition, a major national research project is currently being undertaken in order to assess the contribution of developer-funded archaeology to the study of rural settlement in Roman Britain. Selected evidence from such investigations, much of which is contained in 'grey literature', together with similar evidence from research-driven projects, is being used to create a powerful GIS-linked database (see Fulford and Holbrook 2014; Fulford and Allen this volume; Allen 2016). Also, locally in West Sussex, an extensive LiDAR survey with follow-up fieldwork is being carried out by the South Downs National Park Authority as part of its 'Secrets of the High Woods Project'. This research is revealing a large number of previously unrecorded sites and landscape features of all periods. In contrast, this paper deals only with traditionally published sources, and it can be expected that the results of the ongoing national and West Sussex projects will provide much new information and challenge some of the conclusions reached in this and earlier narratives.

The client kingdom of Togidubnus

A major debate at the turn of the last millennium concerned the

location or locations where the Roman forces landed in AD 43: the ‘traditional view’ favouring Richborough in Kent (Frere 1987, 48–9), with others (including the author) preferring the Chichester/Solent area as re-advocated by Hind (1989). These and other related matters, together with the small amount of ‘evidence’, have been reviewed and discussed by Manley (2002; see also Bird, this volume, South-East).

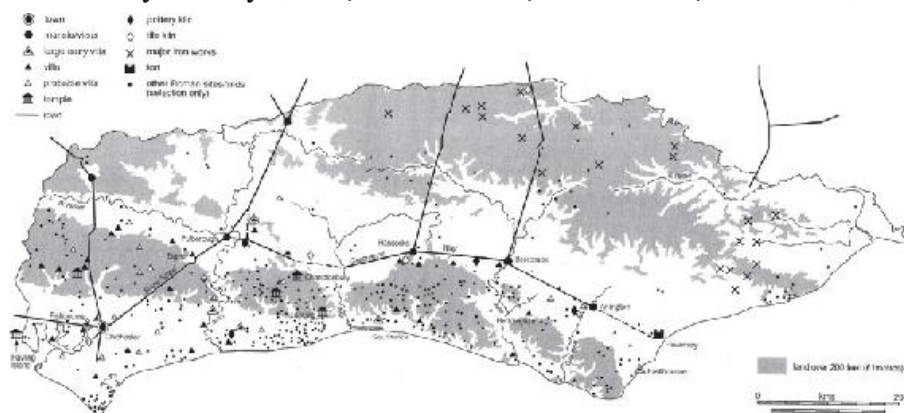


Fig. 5.1: Distribution map of various Roman-period sites in Sussex (after Rudling 1999, 25).

Whether the initial landings took place in Sussex or not, there is some evidence from both Chichester (Down 1988) and Fishbourne (Cunliffe 1971; 1998, 25–32) that may indicate an early Roman military presence at these locations. The evidence from Cunliffe’s Fishbourne excavations forms Period 1A: two rectangular timber storage buildings (‘granaries’), traces of at least one other timber building, and various gravel roads. Cunliffe interpreted this evidence as the possible remains of an early military supply base of *Legio II Augusta* under the command of Vespasian. More recently it has been suggested that these remains could pre-date AD 43. This suggestion is linked to the discovery by Alec Down and subsequent excavators of a large ditch which has been dated to c. 10 BC to AD 25, the first unambiguous evidence for pre-conquest occupation at Fishbourne (Manley and Rudkin 2005a). It is possible that both the ditch and Cunliffe’s Period 1A evidence may have been parts of a pre-conquest Roman defended military site or an emporium involved with the import, and presumably also export, of trade goods (Creighton 2001, 9–11; Manley and Rudkin 2005a, 75; Manley and Rudkin 2006, 105). It is also still possible that the Fishbourne Period 1A remains represent a post-conquest military supply base, probably associated with *Legio II Augusta*. If so these features may be associated with some or all of the Claudian coinage found at Fishbourne between 1961 and 1999

(Rudling 2005), although such coins could also belong to a later phase of construction at the site, such as the putative *principia*, temple, shrine or mausoleum (masonry Building 3) found during research excavations undertaken between 1995 and 1999 by Manley and Rudkin (2005a; 2005b).

The possible evidence for a military presence at Chichester includes parts of two defensive ditches, the remains of various military-type timber buildings and associated finds of military equipment (Down 1988, 8; see above). In addition, the relative proportions of coin finds of the emperors Caligula and Claudius (44 per cent: 56 per cent) have been used to suggest an early (40s) date for the postulated military presence (Sauer 2000, 49).

The events of AD 43 therefore seem to have left little immediate mark on Sussex. This suggests that the 'invasion' in this area met with little if any resistance and was perhaps viewed by many as an army of 'liberation' (Henig 1998; 2002). Soon after the 'invasion' the Romans established or re-established in southern England a client kingdom comprising a large part of Sussex and probably also other areas to the north and west. The only historical information we have about the kingdom concerns one *Tiberius Claudius Togidubnus* (Barrett 1979; Bogaers 1979; Tomlin 1997, 129). The background of Togidubnus (previously spelt as Cogidubnus) is unknown, but he may have been related to Verica who was probably a client king in Sussex, prior to his flight from Britain in c. AD 40 in order to seek the protection and help of Rome. There is no evidence that Verica even accompanied the Claudian 'invasion force' to Britain. Instead, Togidubnus may have been chosen by Claudius to rule all or part of Verica's former kingdom and thus help ensure a reliable and pro-Roman territory on the border of Claudius's new province. Togidubnus' reign is characterised in Sussex and adjacent areas by the successful early introduction at various sites of quite sophisticated elements of Roman culture. Thus at Chichester, probably the principal centre of the initial client kingdom, the embryonic town had a temple to Neptune and Minerva and at least one other public building or an imperial statue (Rudling 2008a, 98–9). Also during this time, at nearby Fishbourne developments probably included the construction of the first buildings with masonry foundations, such as the enigmatic courtyard Building 3, the partly explored Period 1C building beneath the West Wing of the Palace, the 'proto-palace' (or detached bath-house: Black 1993), and finally the Flavian Palace. Near Fishbourne, at Broadbridge and at Bosham,

evidence has been found for other important masonry buildings, including a possible temple (Rudling 2008a, 108–9). Other important discoveries at these locations include both stone and metal sculptural fragments. Some or all of these finds may have been associated with the imperial cult, possible identifications of two of the stone heads being Germanicus and Trajan respectively (Henig 1998; Russell and Manley 2015, 152–62). Further to the west is Hayling Island in Hampshire. Here an important late Iron Age timber temple was replaced in the 60s and 70s AD by a large Gallo-Roman temple built of stone (King and Soffe 2008). The excavators have suggested that the masonry temple, which copies the plan of the earlier shrine, may have been built by Togidubnus in order to reinforce and maintain an important existing cult – perhaps one associated with the Atrebatian king Commius who fled to Britain from Gaul in c. 50 BC and became an important king in the Sussex area. Support for such a cult site may have helped to establish the legitimacy of Togidubnus's own kingship. Alas, with the exception of the temple to Neptune and Minerva at Chichester, the possible involvement or encouragement of Togidubnus at the other sites mentioned above is lacking epigraphic evidence. It is probable, however, that his support, perhaps together with official Roman encouragement, would have played an important role in these examples of the romanisation process during the post-conquest client kingdom.

Following the death or retirement of Togidubnus (perhaps as late as the 80s AD), his kingdom would have been integrated into the Roman province of *Britannia* and was probably divided into three regional tribal units or *civitates*, to which administrative functions were delegated. This pattern would have followed the long-established and cost-effective Roman system of local self-government. Much of Sussex, especially the areas to the south of the Weald and part of south-eastern Hampshire formed the *civitas* of the Regni, with its capital at Chichester (Cunliffe 1973, fig. 1). It has been argued that parts of the Weald where there were large 1st- and 2nd-century iron works associated with the *Classis Britannica* may have been separately administered as an imperial estate (Cleere 1978, 62–3; Cleere and Crossley 1985, 66–9; but see also papers in this volume by Bird (South-East), Hodgkinson and Scott). If so, such a system may explain the apparent absence of both agricultural and urban settlements to the north and east of Eastbourne.

The early villas

A distinctive category of settlement which is often attributed to the period of Togidubnus's client kingdom in Sussex consists of the large and elaborate 1st-century villas, some or all of which are thought to be the residences of members of the pro-Roman indigenous aristocracy (Cunliffe 1973, 74–9; Rudling 1998, 44). The building of such fine houses in Sussex so soon after the conquest may have been due to a competitive desire by the local elite to display their status in a new, romanised way (Millett 1990, 92). Such villas in Sussex include those known or suspected at Westhampnett, Lavant, Tortington, Pulborough, Arundel (at both Tarrant Street and The Shepherd's Garden respectively), Angmering, Southwick, Preston, Newhaven and Eastbourne. Of particular importance as links between these various sites are finds of distinctive flue tiles with similarities in terms of their forms, fabrics and types of roller-impressed keying. As stated above, it is thought that most of the owners of these villas were members of the local elite and that the wide distribution of the villas may be significant, with each located on a distinct block of land which may represent 'the territory over which the land-owning aristocracy held control' (Cunliffe 1973, 79). This pattern might also be due to the distribution of the tribal sub-units, the *pagi*, about which very little is known. With the exception of the well-known site at Fishbourne, however, none of the other early villas in Sussex have been extensively investigated using modern methods and approaches and little is known about them. Whilst brief summary details about most of the possible early villas listed above are provided by Black (1987), and some by Russell (2006), three of the sites have been reviewed in greater detail and are discussed here due to the importance and rarity of this type of villa.

The first villa is that at Eastbourne, and in this case Stevens and Gilbert (1973) reprinted, and considerably expanded with text and illustrations, an earlier report by Sutton (1952). Evidence for this extensive site, which was discovered in 1712, includes a large rectangular 'bath' and an adjacent tessellated pavement, two column bases, and various walls/rooms including a long corridor which still retained part of a tile tesserae floor. The corridor, which probably belonged to a separate building, measured '13ft. wide (interior) and extended ... for about 225ft.' (Sutton 1952, 5). It has been suggested that Roman Eastbourne would have included both a harbour and a large greensand stone quarry – stone from which in the late 3rd century was used for the building of the fort at Pevensey (Sutton 1952, 9).

The second early villa to have been reviewed is Angmering (Black 1987, 87–9; Gilkes 1998; 1999). This villa is located on the West Sussex coastal plain on slightly elevated land, about 5m above sea level. As yet the main domestic range (building ‘B’) of the villa has not been recorded in detail (Scott 1938, 10–12 and fig. 5). Instead, a large detached bath-house (‘A’) located some 55 metres to the east of the residence and separated from it by a ditch, was extensively examined between 1937 and 1939 (Scott 1938; 1939). Other excavations undertaken to the south-east of the baths revealed traces of four more buildings: C-F (Gilkes 1999, figs 6 and 7). Of these, building D to the south-west of bath-house A involved the same wall construction technique as that used for the baths and is thus suggested by Gilkes (1999, 65) to be contemporary with them. Both buildings were also located in the same ditched enclosure, with the main house being located in a separate enclosure. With respect to building A (*i.e.* the large early bath-house), Gilkes (1999, 68 and fig. 8) has identified four main phases, beginning in the mid-1st century, although Black (1987, 152) dates the construction of these baths to the late 1st century on the basis of its roller-stamped flue-tiles. For Black the finding also of fragments of *parietalis* flat wall-jacketing tiles indicates an earlier date for other baths, perhaps a suite attached to building B. Such *parietalis* tiles were also found in the proto-palace baths at Fishbourne. Other important similarities with the site at Fishbourne include the discovery at Angmering of evidence for *opus sectile* floors, black and white mosaics, and the use of Italian marble and limestone.

The most recently reviewed early villa is that at Southwick. This was undertaken after the discovery of some unpublished 19th century plans of the site (Rudling and Leigh 2013), and follows two earlier reviews (Black 1987, 102–4; Russell 2008, 133–8). The plan of the first phase at Southwick is of a large villa of Mediterranean type with four ranges around a central courtyard (Fig. 5.2). The complex was entered via a large chamber in the west range, this being directly opposite a large dining room in the east range. Nearby in the east range at this time may have been a *hypocauston* heating arrangement (Black 1987, 104). It is suggested that similar such indirect hypocaust heating was used at Fishbourne (Black 1985, 77–80). At Southwick the south range comprised a large hall at the west end and the site of the (?)later baths at the other end, whilst to the north of the courtyard *porticus* were domestic rooms surrounded by three large enclosed galleries. The villa also has similarities in some aspects of design to the very much larger ‘palace’ at Fishbourne (Fig. 5.2).

The information now available about the early villas at Eastbourne, Angmering and Southwick is important as, despite the relatively large number of potentially similar sites in Sussex, they are a poorly understood category of villas. There are detailed plans only of Fishbourne and Southwick, both of which are courtyard villas, and few comprehensive settlement histories. The reviews have helped to provide provisional settlement histories for both the Angmering and Southwick sites. At Angmering the dispersed nature of the villa, with some buildings in different enclosures, contrasts with the 'palace' at Fishbourne and the 'mini-palace' at Southwick, where the various villa components were located in a single complex. With respect to the large villa at Eastbourne we have also noted that the bath-house may have been detached, and the same situation may have applied at Fishbourne during the Period 1C ('proto-palace') phase when various buildings, including three masonry ones, were dispersed over a large area (see Russell 2008, fig. 37). In the case of bath-houses, such a situation may, however, have been desirable as it has been suggested that at luxury villas in *Gallia Belgica* the distance of baths from the house was an indication of the status of the owners (Wightman 1985, 111). We are thus beginning to document the differences, similarities and variability in this interesting group of elite villa settlements.

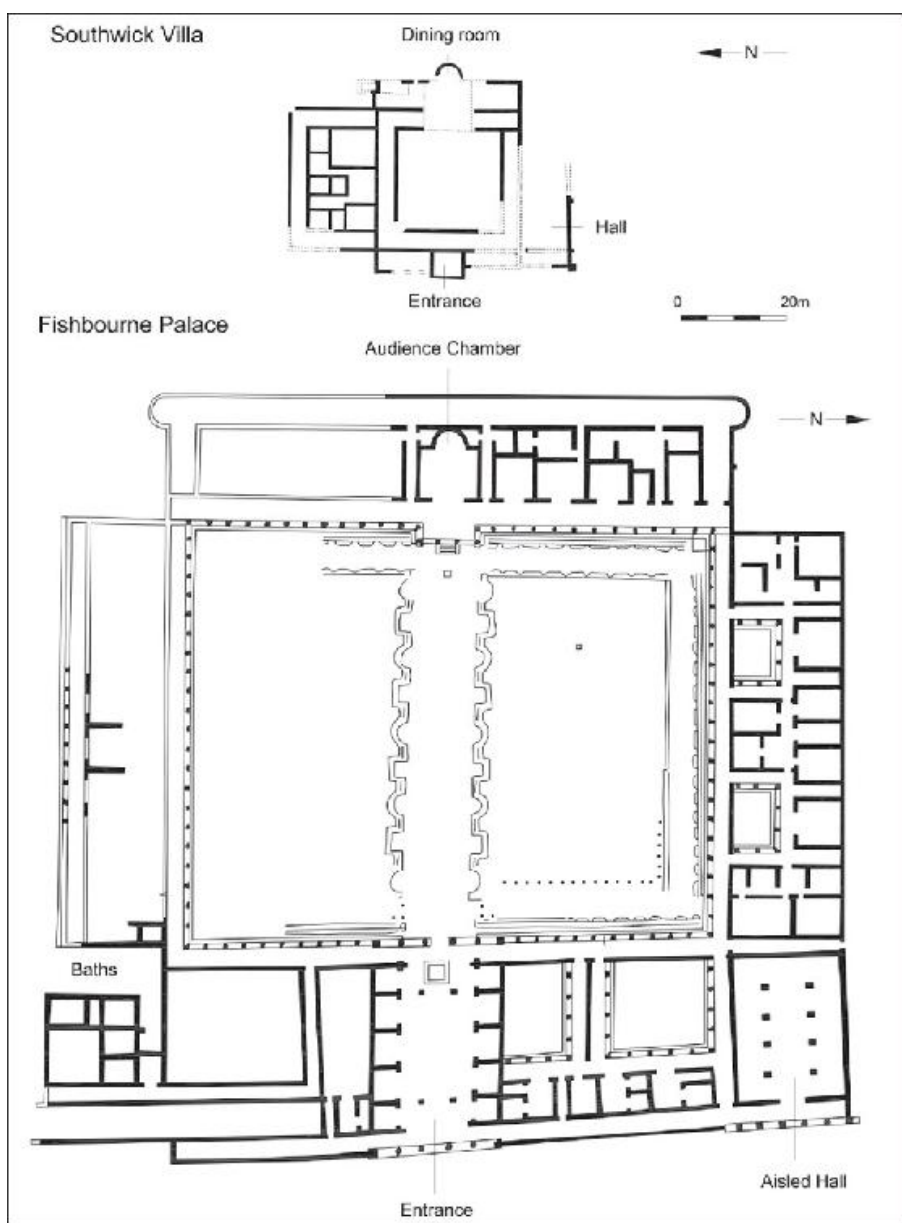


Fig. 5.2: Comparative plans of the Flavian palace at Fishbourne and the contemporary Period 1 'mini-palace' at Southwick (reproduced with the permission of the Sussex Archaeological Society).

One aspect of the early Sussex villas worth noting here is that some of the sites are located at places which would have been suitable for coastal and riverine communications, transportation and trade. Thus Eastbourne, Southwick and Fishbourne provided good access from the sea, whilst Newhaven, Arundel and perhaps Angmering had both good riverine and marine access. We have already noted the possibility of

important trade functions at Fishbourne prior to the conquest, and in Kent an important coastal villa at Folkestone also appears to have been involved in late Iron Age continental and local trade, including the manufacture of locally manufactured quern-stones (Parfitt 2012; cf. Green this volume). Even further inland in Sussex, at the Borough Farm, Pulborough early villa, there is evidence for involvement in the manufacture of samian, whilst nearby at Beedings during the late Iron Age there was the importation of wine in Dressel 1A amphorae. Both sites would have benefited from commanding elevated locations yet with access to nearby trade routes and communications via the river Arun, with the villa also enjoying its nearness to Stane Street (Pope *et al.* 2012, 91). Involvement in trade or its control may thus have been an important source of income for the owners of some of these early villas.

Communications – sea, rivers and roads

The importance of both maritime and riverine communications and transportation has been mentioned above. Probably the main traces of early military activity in Sussex are the major roads (Fig. 5.1). The study of these and others roads throughout Britain was the lifetime work of Ivan Margary (1965; 1967). More recently the study of Roman roads in Sussex in particular, and of South-East England more generally, has been undertaken by David Staveley (forthcoming), this time with the advantages of modern geophysical survey equipment for finding and tracing roads and adjacent sites. Roads linked Chichester to London (which was founded c. AD 50) via crossings of the river Arun at Pulborough and at Alfoldean; to Winchester and to Silchester (*i.e.* other *civitas* capitals); to Selsey and Chichester Harbour. Other major roads included the Greensand Way which lies to the north of the Downs and connected the Hardham/Pulborough area with two important north–south orientated roads: that from London to Hassocks and the other from London to Barcombe. Previously it was thought that these two roads continued southwards to Brighton and to Lewes respectively, but the work by Staveley at Bridge Farm, Upper Wellingham indicates that the London to Barcombe road may have stopped at Bridge Farm (Millum 2013, fig. 1). This work also suggests that after intersecting with the London-Barcombe road in the vicinity of Barcombe Mills, the Greensand Way continued eastwards from Bridge Farm towards Pevensey. Similarly, it is now thought that the London-Hassocks road probably formed a ‘T’ junction rather than a crossroads at Hassocks. It is of course possible that in both cases local

tracks may have continued the north–south routes to the previously suggested end destinations. The two north–south roads referred to above probably provided transportation routes to and from the western group of ironworking sites. Another north–south road linked the eastern group of iron-works to Rochester. The many other minor Roman roads presumably served a wide variety of rural farms and industries.

Whilst some of the Roman roads in Sussex may have followed the routes of Iron Age trackways, the building of at least the main roads probably had, in Roman times, as now with modern roads and rail routes, a massive impact on both the social and economic landscapes. Their construction would have required the confiscation of land and the division of fields, landholdings and local trackways. They would, however, have resulted in considerably increased connectivity and improved access to markets – two of the features of the concept of globalisation which is currently a new way of trying to explain cultural changes in the Roman world (Pitts and Versluys 2014).

Nucleated settlements

Whilst I will consider later some of the nucleated rural settlements in Roman Sussex, space limits do not permit here more than a brief review of Chichester, the only Roman town of any size in Sussex, and the reader is therefore referred to a book on this subject by Down (1988) and a chapter by Russell (2006). It is necessary, however, to consider the role that Chichester must have had within the overall Roman-period settlement pattern of Sussex, it being a major centre of administration, trade and Roman culture, and the start/end of various important Roman roads which connected it to other such centres, including Winchester, Silchester and London (Fig. 5.1). The urban origins of Chichester date to the time of the client kingdom of Togidubnus (Rudling 2008a, 98–9). The settlement's Roman name, *Noviomagus*, means 'Newmarket' and reflects the importance of the Chichester/Fishbourne area before the conquest as a centre for trade (Magilton and Rudkin 1999, 26).

At least two of the major Roman roads in Sussex had associated posting stations (*mansiones*): those at Hardham, near Pulborough (Winbolt 1927) and Alfoldean (Winbolt 1923; 1924) on Stane Street, and Iping (Margary 1953, 1–4, 7) on the Chichester to Silchester road. These three sites, which all have rectangular earthworks, were parts of the Roman communications system (*cursus publicus*) and provided

accommodation for official travellers (Black 1995). Another example may be the recently discovered late 2nd-century double ditched enclosure at Bridge Farm, Upper Wellingham (near Barcombe), which was constructed over part of a much larger settlement area (Millum 2013, fig. 1; Rudling 2016, 75–7). The strategic importance of this location is not just the intersecting here of the east–west and north–south roads, but also the site’s close proximity to the river Ouse which is tidal to this point and thus ideal for linking the transportation of heavy goods, such as iron or corn, by both road and waterways (Millum 2013, fig. 2). A similar settlement history seems to have occurred at Alfoldean, which was located at a river crossing, and here the primary *mansio* complex was enclosed by a substantial bank and ditches during the second half of the 2nd century (Luke and Wells 2000). At both Alfoldean and at Bridge Farm the occupation areas extend well beyond the ditched enclosures. Such *vici* settlements would have provided markets and industrial facilities and perhaps also various religious shrines/functions. A similar type of settlement probably existed at Hassocks where the Greensand Way and the London-Hassocks roads intersected. The archaeological evidence in support of this idea includes extensive traces of occupation and a large cemetery (Lyne 1994). Yet another such settlement was probably located at Arlington where the eastern stretch of the Greensand Way (*i.e.* from Bridge Farm to Pevensey) crossed the River Cuckmere. Archaeological evidence from this area includes that for Roman-period pottery manufacture and widespread occupation activity (Holden 1979; Holden and Homes 1985). Other Sussex Roman-period nucleated centres would have included the ports at Bodiam (Lemmon and Hill 1966), Seaford, where an extensive area of settlement activity and a large early cremation cemetery have been found (Smith 1939), and that thought to have existed adjacent to the west gate of the large late Roman Saxon shore fort at Pevensey.

Rural farms

Many native/‘peasant’ farmsteads have been found in Sussex, especially on the coastal plain and on the Downs, but also increasingly in the Low Weald. Many of these sites were first occupied in the late Iron Age or earlier, and some continued into the 5th century. In *The Regni*, Professor Cunliffe (1973, 74) selects two things to characterize the rural settlement of Roman Sussex: ‘a strong element of continuity, many sites originating well back into the preceeding Iron Age or even earlier, and a very marked discrepancy in wealth which appears

dramatically within thirty years of the Roman invasion and remains a feature of the social scene until the early decades of the 5th century'. He further states that 'the relative distribution of rich and poor settlement is not random. The poorest establishments, the peasant farms and villages, are fairly evenly scattered over the chalk Downs and the coastal plain, but the richer farms – the villas – tend to select various locations where the soil is more productive'. Such optimal locations are identified as occurring in three main zones: the coastal plain, the southern fringes of the Downs and the Upper Greensand ridge.

Whilst most of the rural sites in Sussex were associated with farming, others were either partly or fully involved in industry. The large majority (perhaps 85 per cent or more) of all Roman-period farming settlements in Britain, however, were the less sophisticated farms (Hingley 1989, 4–5) and prior to the 1970s these received relatively little research interest, most of which was concentrated upon the richer villa settlements. However, many of the villas in Sussex and elsewhere in Britain began as more humble establishments which over time developed into villas. The study of native farmsteads therefore remains a research priority; fortunately, since 1990 this problem is being addressed with the aid of planning conditions and developer funding.

Farmsteads: the Downs

Bishopstone is a good example of a farmstead site with a long history. It was also excavated on a large scale using modern methods (Bell 1977). A rectangular enclosure (0.35ha) was laid out early in the Roman period. This was located in the north-east corner of an early Iron Age enclosed settlement, which in turn had been sited on an area of Neolithic occupation. Subsequently, during the later Iron Age, there was a phase of unenclosed settlement. The Roman-period enclosure was divided into two by a cross-ditch, the northern area being approximately twice as big as the part to the south. The enclosure ditch had become silted up by the late 2nd century and Bell suggests that there may have been less activity on the site during the 3rd century, followed by a more intensive phase of occupation in the 4th century when a corn-drying oven was in use. The function or functions of 'corn-drying ovens', which are common features on Roman-period rural settlements, has been the subject of much debate and it is possible that they were used for various purposes including the drying of grain prior to storage, the preparation of grain prior to milling, and

malting (Rudling 1988, 208). They may also be an indicator of increased agricultural production. Other discoveries included pits and post-holes, some of the latter being in groups suggestive of structures, but nothing which could be definitely interpreted as a domestic building. Finds of animal bones and charred seeds indicate that the settlement's economy was based on mixed farming. Romano-British occupation at Bishopstone may have lasted into the 5th century, before being replaced by a Saxon settlement. A field system outside the Iron Age and Romano-British enclosures yielded evidence for intermittent cultivation from the Neolithic to Roman periods.

At Bullock Down, Beachy Head, an intensive multi-period settlement and land-use project located two Romano-British farmsteads and extensive traces of associated fields and trackways (Rudling 1982b; Fig. 5.3). During the Roman period these field systems and trackways, which had been established in the Late Bronze Age-early Iron Age, continued in use and were developed and probably expanded. The two Romano-British settlements (sites 16 and 44) are located adjacent to a double lynchet trackway which appears to have previously linked an early Iron Age settlement site to the large earthwork enclosure at Belle Tout. Many of the prehistoric/Roman-period fields on Bullock Down were laid out perpendicular to this trackway. Common features in this agricultural landscape were quarry pits for the obtaining of chalk to spread on clay-with-flints fields (*i.e.* marling). Such quarries represented both continuity with the past (Pliny the Elder noted that the Britons applied chalk to clay fields: *Natural History* XVII, 4, 42–8), but also, given the size and regularity of the pits on Bullock Down, the probable expansion and intensification of arable cultivation.

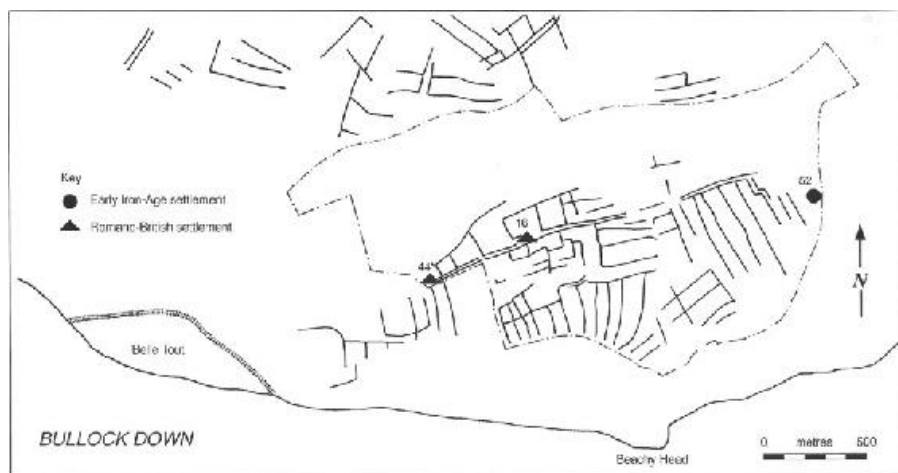


Fig. 5.3: Plan of field systems, trackways and settlement sites on Bullock Down (Beachy Head).

Neither of the Romano-British settlements on Bullock Down can be said with certainty to pre-date the Roman conquest. Indeed, the late Iron Age generally is only poorly represented on Bullock Down and may represent a period of land-use (e.g. grazing) but minimal settlement activity on this part of the Downs.

At Site 16 on Bullock Down survey revealed nine possible ‘house platforms’ arranged in three pairs and a probable fourth pair or perhaps a group of three. The total excavation of one of the platforms revealed a terrace with a fence line, several pits, some isolated post-holes, but no obvious structural evidence for a building. The large amounts of recovered pottery, however, indicate that there had probably been a dwelling on this terrace. If so it must have been of a type which did not leave any trace in the archaeological record, or if it did, one which has subsequently been destroyed by ploughing, such as forms of timber-framing and the use of either walls of turf or cob. It is thus possible that at Site 16 there had once been four groupings of at least two buildings each. Such groupings may have formed separate ‘houses’ as has been suggested regarding similar evidence at Park Brow (see below). Given the spacing of the ‘paired platforms’ it is likely that such houses were contemporary with each other. If this idea is correct, the settlement might have been a ‘hamlet’ or the residence of an extended family. Occupation spanned the 1st to 3rd centuries, and unusual finds included several 3rd-century coin hoards and a number of exotic metal objects (Rudling 2014, 67–71 and 73). These unusual discoveries, which have been referred to by Hingley (1989, 161) as ‘unexpected signs of wealth’, indicate that the inhabitants of settlements such as Site 16 may have had access to wealth, perhaps due to the rewards of agricultural intensification, but chose not to use it to build ‘Roman’ style houses or to take up other aspects of ‘Roman culture’. Instead, at some sites, as on Bullock Down, the inhabitants may have preferred to bury their ‘wealth’, perhaps for votive reasons.

Excavations at the other Romano-British settlement on Bullock Down, Site 44, focused on a possible farmyard area adjacent to a ditched enclosure which is thought to have contained the settlement area. Features associated with the farmyard comprised two corn-drying ovens (Fig. 5.4), a possible threshing floor, fence lines, and various pits and post-holes. The date range for this site extends from

the early 1st century to the late 4th century or later. One sherd of hand-made pottery with 'wurm' stamps of Germanic type could date to the early 5th century (Rudling 1982b, fig. 52: no. 150). The two corn driers yielded charred seeds of spelt wheat and of barley. As stated above, these features may be evidence for the expansion and intensification of arable cultivation. The bone assemblage, as one might expect on the waterless downs, indicates a predominance of sheep. In addition to their importance for meat and wool, and perhaps milk, these animals would also have provided manure for the maintenance of soil fertility.

The final downland farmstead case study is that of Park Brow, to the north of Cissbury. Given the absence of tangible evidence for domestic buildings at Bishopstone, Bullock Down and various more recently excavated sites, this settlement, which was excavated in the early 20th century, is still the main source of information, however atypical, regarding domestic rectangular architecture at such sites. As at Bishopstone and at Bullock Down, the Romano-British settlement at Park Brow is located in the vicinity of earlier late prehistoric settlements, fields and trackways. The Roman-period settlement, which had not then been deep ploughed, consisted of five rectangular 'house sites', various pits and three possibly successive boundary ditches (Wolseley *et al.* 1927). One of the house sites was totally excavated and proved to have had walls made of vertical timbers with wattle and daub infilling, which was internally decorated by the application of red painted plaster. The finding of clay roofing tiles, window glass and a door key are other indications of the level of sophistication and 'romanisation' of this building. Further signs of Roman influence and contacts at this site include finds such as samian and amphorae.



Fig. 5.4: Bullock Down Site 44. Large corn-drying oven viewed from the stoke-hole (photograph: author).

As only one of the five house sites at Park Brow was excavated it is not known how many were in use at any one time. They may, therefore, represent successive single ‘hut houses’. Or, if some of the huts were contemporary individual houses, they may have formed a ‘hamlet of cottages’ (Cunliffe 1973, 98). Alternatively, it is possible

that two or more contemporary 'huts' may have been used by one family for different purposes and that collectively these formed a 'house' (Rivet 1964, 108). Black (1987, 96–7 and fig. 40) has suggested that the huts at Park Brow fall into two groups, each with a principal building which is approximately the same size in each group. He further suggests that the two groups were not contemporary but 'look like two discrete houses'. Such groupings of single room 'huts' may also have existed at the plough-damaged Site 16 on Bullock Down (see above).

It is important to note that not all Romano-British houses on the Sussex Downs were rectangular. Thus at Selhurst Park, near Chichester, the main domestic residence was a roundhouse on a platform which had been terraced into the sloping face of the chalk spur upon which the site was located (Anelay 2008, 18). The drip gully to the roundhouse roof was found intact but no evidence was found for any post-holes, therefore the nature of the superstructure of this building is uncertain.

The roundhouse referred to above was located in the eastern of three subdivisions of a large ditched enclosure. The central subdivision was apparently the working area and contained a number of large pits, dug into the chalk. With pit shape varying from circular to rectangular, and pit depths from c. 1m to 2m, the excavator suggests that they were used for some sort of agricultural storage or processing. In contrast the western subdivision within the enclosure was devoid of archaeological features and is interpreted as a coral for animals.

Farmsteads: the coastal plain

Sustained house building and other development work on the West Sussex coastal plain in recent decades has resulted in many archaeological excavations. Many of these have revealed traces of Roman-period farmsteads, ditched field systems and sometimes other types of rural sites. Thus in 1990 work in advance of the construction of the A259 Rustington Bypass revealed finds of Roman date including both quernstones and millstones associated with the remains of what had been a timber structure and in the vicinity of undated waterlogged timbers (Rudling and Gilkes 2000). Given the proximity of a watercourse (the 'Black Ditch'), these findings may indicate that the site was involved in water-milling. If so, this may be another indicator of increased agricultural production. Elsewhere as at Middleton-on-Sea (Griffin 2005) and at Titnore Lane, Goring-on-Sea (Clarke 2012), rescue excavations have revealed parts of Roman-

period ditched field systems. At the Goring site, which revealed evidence for activity spanning most of the period from the Mesolithic to the modern period, occupation during the later Iron Age consisted of an unenclosed nucleated settlement consisting of several phases of roundhouses with an associated large artificial pond. Later the settlement was replaced by the early Roman-period field system and activity associated with the Goring Villa which is located a short distance to the south of the site. Romano-British activity continued into the 2nd century before the site was abandoned. Roman-period features on the site included drainage ditches, ditched enclosures, large pits and some isolated post-holes. At Middleton-on-Sea, previous excavations on another site revealed part of a Romano-British farmstead with occupation spanning the 1st to 4th centuries. A probable rectangular post-built building was identified, as well as numerous post-holes, pits, ditches and stake-holes (Barber 1994). Economic data from this site indicates a mixed farming regime.

Farmsteads: the Weald

It was until fairly recently thought that Roman-period rural sites, other than ironworks, were rare in the Weald. Today that thinking is changing as increasing numbers of archaeological projects are revealing a different scenario. One of the first such projects took place at Burgess Hill where evidence was recovered of Romano-British activity from the 1st to 4th centuries (Sawyer 1999). The most substantial feature found was a 'T'-shaped corn-drying oven. Pottery finds from the flue date to the later 4th century. Other features at the site included pits, two ditches and six shallow circular hearths. One hearth yielded some iron-forging slag and may thus be associated with secondary ironworking.

Another example of a Roman-period Wealden rural site is one found on land west of Mackie Avenue, Hassocks. Here, in addition to the discovery of three post-built Bronze Age roundhouses, were found the remains a Roman-period rectangular post-built structure within a rectangular enclosure, a 7m diameter sub-circular enclosure or ring-gully, various pits, and an associated field system (Mullin *et al.* 2010). It is possible that the rectangular structure, which was open-sided along the east side, was used for stock-keeping. The function of the other structure is uncertain. Dating evidence for the Roman-period activity at this site spans the 1st to 3rd centuries.

Villas

The term 'villa' is often used to refer to a domestic house or complex which significantly reflects the 'Roman' style of life. Most of these sites are assumed to have been the centres of farm-estates, although other functions are also possible, such as involvement in rural industries. The villas of Sussex have been reviewed in various surveys, articles and books (Cunliffe 1973; Down 1979; Black 1987; Rudling 1988; 1998; 2003a; Scott 1993; Russell 2006). The earliest, and amongst the largest and most elaborate of the Sussex villas, are the 'Early Villas' discussed above in the section on the client kingdom. Some of these villas, such as Fishbourne and Southwick, are clearly derived from Mediterranean rather than north Gallic-type villas. In addition, the buildings at some of these sites share similarities in elements of design, construction and decoration, and may have involved the same architects and builders. With the exception of Fishbourne where new excavations have begun to document a significant pre-conquest phase of occupation at the site, there is a general lack of evidence for Iron Age activity at the other early villas which instead appear *de novo* at a large size.

In contrast, most of the other Sussex villas involved gradual development out of native farms, a pattern which is normal for many areas of Lowland Britain. Such development has now been investigated in detail at two Sussex villas in the Ouse valley, namely those at Beddingham (Rudling 1997; 1998, 52–9; 2003a, 118–21; 2003b) and at Barcombe (Rudling and Butler 2002; 2004; Rudling 2003a, 119–21; 2003b; Rudling *et al.* 2010). At both sites the sequence of building development extends back to timber, circular structures/houses of indigenous Iron Age type.

At Beddingham, where there is evidence for earlier prehistoric activity at the site, there was only a little evidence (including two coins) for possible occupation during the late Iron Age. Dated to the early 1st century is a two-phase, timber circular structure – perhaps a roundhouse or a possible shrine. The location of this structure was apparently respected long after it had gone out of use, and encroachment (presumably unintentional) only happened during the final construction phase of the main villa building. This very long period of respect for, or memory of, the location of the circular structure is a rare indication of probable continuity of ownership. Phase 1 of the adjacent rectangular masonry house, which does not encroach upon the circle of post-holes, is thus thought to have been built alongside it. Phase 1, which is dated to the Flavian period (*i.e.*

contemporary with some of the large early villas), consisted of a line of five adjoining rooms (*i.e.* a 'strip villa'). It is possible that this house may have replaced an earlier 'proto-villa' building made of timber. Subsequent developments to the house included: the addition of baths at the northern end of the building; the adding of a corridor/range to the west side and a corridor and two wing rooms to the east side of the main range of rooms, thus creating a 'winged corridor villa'; the demolition and infilling of the earlier baths and their replacement by a new northern range; and finally the construction at the southern end of the building, which partly overlays the original circular structure, of an irregular veranda wall. In addition to the main house the excavations at Beddingham also revealed a well, a small shrine, the site of a possible detached bath-house and two phases of enclosure ditches. Whilst the main house may have gone out of use by the middle of the 4th century, limited occupation may have continued at the site. During the late 4th/early 5th century the disused former shrine was re-used by people with access to both late Roman and early Saxon pottery.

At Barcombe the sequence of villa development is similar to that at Beddingham, but here the earliest settlement phase comprised at least four timber roundhouses located within a rectangular ditched enclosure. Not all of the roundhouses were contemporary with each other, however, and pottery finds indicate that occupation at the site might have started before AD 43. Subsequently, in the mid-2nd century, a rectangular building with masonry footings was constructed. This structure may have co-existed alongside one or more of the roundhouses – perhaps a common scene in Britain during the early stages of the adoption of Roman building methods and designs. About a century later both the 'proto-villa' and any surviving roundhouses were replaced by the building of a large winged-corridor house. This building faced south onto a walled yard with a large aisled building along its eastern side. Two of three rooms at the northern end of the aisled building had tessellated floors and probably provided higher status accommodation than the aisled area to the south. Traces of a small bath-house were found under the west wall of the aisled building. Roughly in the middle of the yard was a stone-lined well. To the west of the walled yard was a separate large hall building with two flanking rooms at the southern end. The function of this building is unknown.

Whilst it appears that the main house at Barcombe may have been

abandoned by c. AD 300, limited occupation of the aisled building seems to have continued during the 4th century. It is thus probable that at both the Beddingham and Barcombe villas activity/occupation continued with absentee owners. The combination at Barcombe of a winged-corridor house and an aisled building (Fig. 5.5) can be paralleled at other villa sites, such as at Bignor (see below). Whilst aisled buildings are sometimes regarded as villas in their own right (Sussex examples include West Blatchington and a site near Fishbourne Palace), at other sites they may have served various functions, including accommodation for villa servants or slaves, the provision of a large meeting place (*i.e.* the central 'nave' area), and perhaps some agricultural storage. The absence at Barcombe villa of a permanent bath-house can perhaps be explained by the discovery in the adjacent field of a large detached bath-house. These baths may have served both the inhabitants of the villa and others who worked on the villa estate. In addition, the baths may have served a much wider community, perhaps including those who lived at, or used, the Bridge Farm nucleated settlement which is located nearby and was accessible by road and possibly also by water.

My third case study is that of Bignor, one of the largest and most luxurious villas in Britain and famous for its high quality mosaics. The villa is situated on the southern slope of the Upper Greensand, just north of the chalk Downs, and a short distance from Roman Stane Street which connected Chichester to London. Since its discovery in 1811 the site has been subject to various antiquarian and archaeological investigations, the story of which, together with a thorough discussion of the findings and the site today, is the subject of a new book (Rudling and Russell 2015; *cf.* Frere 1982; Aldsworth and Rudling 1995).

Bignor villa had a rather curious developmental history and is of particular interest here because by the mid-3rd century it was similar in size and form to the contemporary villas at Beddingham and at Barcombe which were approaching their peaks before going into decline. How then and why did Bignor go on to prosper and become such a large and luxurious villa during the late 3rd and early 4th centuries? The developmental sequence starts with some limited evidence for Iron Age activity at the site, before the construction during the late 1st century AD of a ditched enclosure. During the mid-2nd century an extensive building (or buildings) was constructed in the area of the later large baths. This involved the use of masonry

foundations and a building orientation which is roughly parallel with the east ditch of the earlier enclosure, but different from subsequent developments at the site. The purpose and fate of this building are not known. In about AD 180 a new house was constructed in the north-west corner of the earlier ditched enclosure. After a fire in c. AD 250 this timber house was replaced by a winged-corridor building with masonry foundations. Probably at this time or earlier, a large aisled building with stone footings was erected just to the north of the former north-east corner of the early ditched enclosure. This combination of an aisled-building and a winged-corridor house, and also their locations relative to each other, thus parallels that at contemporary Barcombe (and also at other villas, such as at Sparsholt in Hampshire: Black 1987, fig. 32). Soon after, in the late 3rd or early 4th century, the site was transformed from being a relatively humble winged-corridor house into a richly decorated and equipped large courtyard villa with an outer courtyard delimited by a stone wall and two entrances. The sequence of this development was put forward by Ernest Black (1983) and has been confirmed by excavation (Aldsworth and Rudling 1995). To date the most plausible explanation for such dramatic and expensive changes at Bignor is a change of ownership. Despite the heavy expenditure at Bignor, however, the site shows signs of considerably reduced activity during the mid-late 4th century. Perhaps this was a period with an absentee owner? The final fate of the site is unknown, but evidence of roof collapses may indicate abandonment.



Fig. 5.5: Barcombe villa. Artist's impression of the villa c. AD 250 with the winged-corridor house and aisled building (drawing by Andy Gammon).

The fates of other villas varied considerably. In the case of the large early villas some of the establishments, including both Southwick and Fishbourne, may have been overambitious projects and show signs of contraction during their later phases (the 'palace' at Fishbourne may

only have functioned as such during the final years of Togidubnus's life). During the 3rd and 4th centuries increasing inflation, pirate raiding along the south coast, the establishment of a substantial military presence with forts at Pevensey and at Portchester, and regime change following the defeat of Allectus (the 'British Emperor') by Constantius I, may all have been factors which led to a large number of villas, especially coastal ones, being either deserted as at Fishbourne, or subject to contraction with probable absentee owners as at Beddingham and at Barcombe. During this period, however, various villas located inland and away from coastal raiding and military garrisons, as at Bignor and to the north of Chichester, were continuing to develop and perhaps expand by taking over other farms and estates. Finally, in the late 4th or early 5th centuries these villas too show signs of decay or abandonment. An exception is the villa at Batten Hanger, Elsted, where the final phase of construction work is thought to date to c. A.D 410–20 and comprised an unusual cruck-trussed-type hall-like building with a masonry end gable (Kenny 2008).

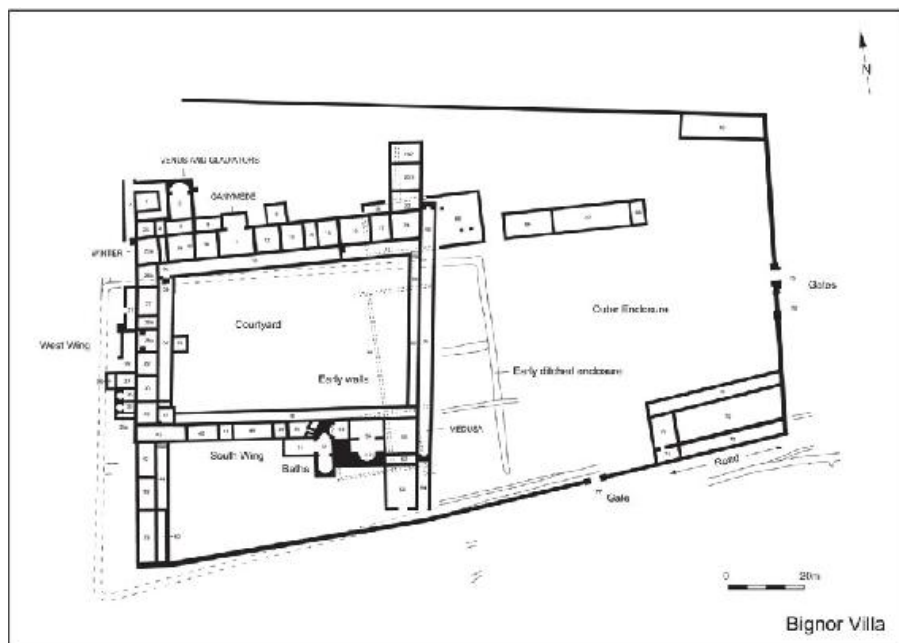


Fig. 5.6: Bignor villa. A revised plan of the villa (based upon that of Aldsworth and Rudling 1995, fig. 62).

Rural industries

In addition to farming, various other industries were undertaken in Roman-period rural Sussex (Cunliffe 1973, 110–25). These included:

ironworking (see Hodgkinson, this volume; Cleere and Crossley 1995, 57–86), the making of pottery (Lyne 2003) and tiles, the quarrying of stone, the extraction of salt (see Biddulph, this volume), and forestry. The origins of some of these industries, such as the production of querns at Lodsworth (Peacock 1987), can be traced back to the Iron Age (see Green, this volume). Others, such as the making of tiles (as at Hartfield: Rudling 1986), were completely new enterprises and were needed to meet the demands of Roman culture, including the construction industry. The road network and waterways played important roles in the transportation and distribution of various products. In the late 4th century, the end of the supply of bronze coinage to Britain must soon have caused major problems to both rural and urban industries.

Religious sites and burials

Religious sites were another important feature of the Romano-British countryside. Whilst some shrines/temples are known from Iron Age Britain (e.g. at Hayling Island: King and Soffe 2008), most have left few obvious traces in the archaeological record, many being apparently associated with sacred groves, trees and watery places. At Mount Caburn, near Lewes, however, a study of the finds recovered during the excavation of a large number of pits has led to the conclusion that in the Iron Age the site was of ritual significance and was used for the ‘structured deposition’ of material, such as potin coins, in the pits (Hamilton 1998). One large pit/shaft contained some Roman pottery and may thus indicate continuity of ritual after the conquest. Elsewhere in Sussex other Roman-period rural ritual sites include various temples and shrines, examples including those inside Chanctonbury Ring (Rudling 2001) and at Lancing (Bedwin 1981), a well/ritual shaft at Findon, and various Bronze Age barrows, such as those at Slonk Hill, Shoreham (Hartridge 1978), which in Roman times were treated with respect and re-used as shrines. In another paper I have reviewed and discussed these and various other Roman-period Sussex religious sites and finds (Rudling 2008a).

The dead of Chichester (excepting very young infants) were buried in cemeteries outside the town walls. During the early Roman period most people were cremated, but later there was a gradual switch to mainly inhumation burials. The same generalisations apply to burials in the countryside of Roman Sussex, but here the locating of cemeteries and burial sites is difficult and has mostly occurred by luck

(if archaeologists) or by chance. One of the county's best examples of a Roman rural cemetery is that found on the route of the Westhampnett Bypass, near Chichester. Whilst the site of this cemetery is much better known for its much larger Iron Age cremation cemetery which lay to the north-west, the Romano-British cemetery comprised 36 cremation burials and spanned the period c. AD 70–150. The graves, which focused on an undated ring ditch, may represent the burial ground for just one or two families (Fitzpatrick 1997, xi). The Iron Age and Roman-period burials, together with those from a small Anglo-Saxon inhumation cemetery, and a ring ditch of probable Bronze Age date, were all found on a low hill and demonstrate repeated use of the same site but not complete continuity of practice as, for instance, there was a gap of over a century between the Iron Age and Romano-British burials.

Conclusions

Roman-period rural settlement in Sussex involved both continuity of locations and functions, many farms indeed beginning in the Iron Age or even earlier, but also change, both in terms of the development of new locations and types of site, and also both minor and major alterations to long-established settlements, technologies and material culture. In addition, whilst some aspects of Roman culture, especially Roman goods such as samian, were quickly and widely adopted by the natives of Sussex, other aspects such as imported religious beliefs and rituals did not gain such general acceptance and often failed to replace traditional practices. Amongst the local elite, however, a competitive desire for power meant that such people wanted to 'become Roman' and thus distinguish themselves from the common people. The relatively large number of 'Early Villas' in Sussex can probably be explained in this context, with the villa owners expressing their wealth and status via their romanised country houses and life styles.

Acknowledgements

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Chapter 6

Rural Settlement in Roman-Period Surrey

David Bird

Introduction

Surrey's suburban image, which is surprisingly wide of the mark, can obscure attempts to understand the county's very rural past. Yet Surrey has the highest percentage tree cover of any county in England and more open access countryside than other parts of the South-East, mostly and significantly because of the areas of poor soils. The county often disappears in general discussions, partly because Surrey does not fit easily into wider patterns and in fact seems to be something of a frontier region. The very name is unusual among English counties in that it refers to a region and not to some kind of grouping of people or the area around a chief town.

In many ways it is difficult to discuss rural settlement in Roman-period Surrey: we still have far too little evidence. There are relatively few known buildings apart from stone-founded villas for reasons already noted for the South-East in general (Bird, this volume) but probably at their worst in Surrey. The soils are often difficult for archaeological excavation: sands, heavy clays, complex mixtures, while the sands (and even the gravels: Jones 2009a, 3) 'eat' bone too, and quickly: in clearance of 19th-century burials at a Brockham chapel it was noted that 'soil conditions meant that bone survival was poor ...' (Howe *et al.* 2005, 279). Aerial photography faces many difficulties. The results of recent geophysical surveys as a means of finding or amplifying our knowledge of sites should therefore be stressed, for example the important results from Abinger and Flexford (see further below).

It is likely that significant archaeological evidence was lost long ago, for instance in the large gravel pits around Staines and Chertsey – the cost of being close to London. More recently a county-wide policy was established that led to assessment and evaluation of development sites of 0.4ha or more including those on 'difficult' subsoils, and this has provided important new evidence as well as tending to confirm assumptions about overall settlement patterns. More detail can be added to recent surveys of Roman-period Surrey (Bird 2004a; 2004b),

but it remains the case that the best evidence for sites in their setting is on the sands and gravels and there is a great deal still to learn about how other parts of the landscape were managed.

Geological background

‘Certainly in one respect – for varied short-distance walks – it is difficult to match Surrey anywhere. Five miles will often take in as many different types of landscape’ (Nairn and Pevsner 1970, 17). This variety arises from the complex geology of the area and, as Brandon and Short note (1990, 8), ‘much of Surrey has never been a very promising environment for agriculture’. It is clear that this has had a marked effect on settlement and population density. For example, the Domesday records show two urban centres in Surrey, one of which was Southwark, effectively a suburb of London, against seven in Sussex and eight in Kent (Darby 1962, 617–18 and for overall population see 568, fig. 168). What we know of the villas suggests that this comparative difference was just as marked in the Roman period (for consideration of the overall population see Bird 2004a, 79). Surrey’s historic towns were small, in plan almost the size of one-street villages in some counties (O’Connell 1977). In the medieval period much of the county was royal forest; the large areas of heathland and large number of deer parks are also significant. Even in the later 19th century the south-west of the county sounds more like Thomas Hardy country than an area only about 60km from the centre of London (Jekyll 1904, esp. 230).

Surrey’s geology can be thought of as roughly east–west bands divided by the Chalk ridge of the North Downs and the Hogs Back (Fig. 6.1). The gravels and alluvium of the Thames form the northern edge while the tributary rivers, especially the Wey, Mole, Hogsmill and Wandle, cut southwards across the bands and provide some local amelioration of the poorer soils as they do so.

The north-west quadrant of the county is mostly Bagshot Beds with some London Clay, while the latter largely accounts for a much larger part of the north-east corner. Neither is favourable to agriculture (including the plateau gravels over the Clay). In 1781 Thomas Day (always quixotic) ‘bought one of the most unpromising patches of land possible, two hundred acres of Surrey heath attached to Anningsley House at Ottershaw near Woking. ... “The soil I have taken in hand, I am convinced, is one of the most completely barren in England”, he wrote, with morose relish’ (Uglow 2002, 344). He was not alone in

that view (cf. Bird 2004a, 76, and for 1336 see Blair 1991, 10). For the 'heavy London Clay outcrop' we may note that it 'gave rise to some of the poorest agriculture in that county [Surrey]' (Brandon and Short, 1990, 10).

Some parts of the North Downs have thin chalk soils but a great deal is covered by surface deposits such as Clay with Flints, which again lead to mostly poor soils. North of the Downs a generally thin strip of Reading Beds, and to the south a 'fertile greensand belt' (Stamp and Willatts 1942, 378, fig. 22) provided better soils, but mostly the Lower Greensand is infertile, occupying much of the south-west quadrant as the deposits swing southwards around the Weald, while the south-east corner of Surrey has much more of the 'intractable Weald Clay' (Brandon and Short 1990, 10) and a small area of the Hastings Beds of the High Weald. In the early 20th century the Clay was regarded as 'cold and retentive of moisture, but liable to bake and crack in a spell of prolonged dry weather. It is a difficult and expensive soil to work, ... easily rendered unfit for the plough by wet weather, and when once completely soaked by rain it takes a long course of dry and windy weather to restore it to a workable condition' (Spencer 1912, 458).

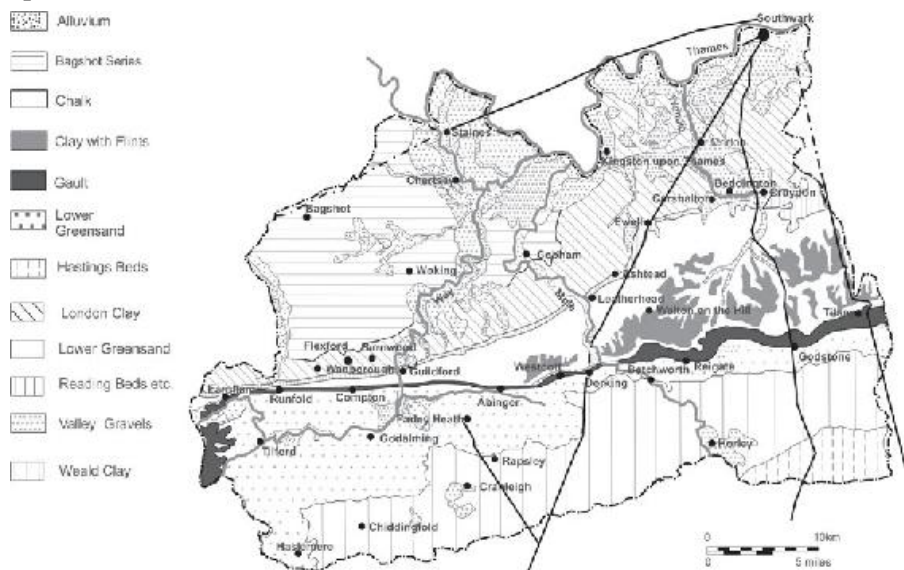


Fig. 6.1: Surrey: geology and the location of major places mentioned in the text. The main rivers and the known Roman roads are also shown. The historic county is the area south of the Thames, with the parts lost to London boroughs and Sussex marked; north of the river the area around Staines that is part of the modern administrative county (formerly part of Middlesex) is also marked. (After Bird 1987, 179, fig. 7.7; 2004a, 10, fig.

Locally of course there are many variations and these mostly explain apparent anomalies in the settlement pattern. In particular, a good case can be made that most of the Roman-period settlement followed the river corridors across the areas of poor soils. This is more likely to be because of improved soils, a good water supply and extra resources such as fish than anything to do with use for transport of goods.

Settlement

Not surprisingly, the evidence for settlement in Roman-period Surrey is almost all rural, including anything that might be classed as a 'small town'. The only sign of anything truly urban is in Southwark, obviously then as later acting as London's suburb. Otherwise, Staines and Ewell are the nearest equivalent to small towns although there are hints of nucleated settlements elsewhere (Bird 2004a, 49–72). Thus at Kingston there is some evidence for high status buildings (*e.g.* Brown 2005) and a general spread of evidence with more perhaps having been lost as a result of river action (Bird 2004a, 66). This would provide a centre approximately halfway between Southwark and Staines along the Thames corridor and there is some reason to postulate centres at about 10 km intervals (measured by land), the gap either side of Kingston being filled by settlements around Putney (Bird 2000, 156) and somewhere in the general area around Walton on Thames. This area is very likely to have suffered considerably from changing river courses (see *e.g.* Bird 1999, 112–3), but there are several pointers to its likely importance. Each of the postulated centres would be near an important confluence with the Thames: Staines/Colne; Walton area/Wey; Kingston/Hogsmill; Putney/Wandle. Brentford (with the Brent) should be added to this list: going by river it neatly fills a long gap between Kingston and Putney and it would have served an area north of the Thames (see most recently Cowie *et al.* 2013).

Apart from Ewell, which probably had an extra function as a ritual centre (Bird 2004a, 147–50), the other possible centres we know seem of lesser importance and probably mostly had some road-related function, as at Croydon and Merton and further south near Godstone, Dorking, and Flexford (Bird 2000, 156; 2004a, 62–6; Howe *et al.* 2008, 370–1; 2014, 238–41). In each case the existence of a nucleated centre (or even its related road) is somewhat speculative. Thus the

known northern nucleated settlements seem to be larger and more 'genuine', which no doubt reflects their proximity to the better farmland. The existence of roadside villages, some at least with an official *mansio* function, highlights the effect of the road network but it is not clear how much difference this made to farms and the like. There is no obvious pattern of finds following the London-Silchester road, or Stane Street into the Weald for example. As well as the difficulties involved in crossing the Weald Clay already noted (Bird, South-East, this volume) travel across parts of north-west Surrey is likely to have felt hazardous; this was a haunt of highwaymen in later times. The rivers are unlikely to have been of much use as a means of communication, apart perhaps from the Thames (useful discussion in McKinley 2004, 63; cf. Bird 1996, 228 n.12).

There are relatively few villas in Surrey; by pulling together all scraps of evidence perhaps 30–40 can be postulated. The evidence suggests that they mostly favour the locations giving proximity to better or at least mixed soils and good water supplies, as might be expected (Bird 2004a, 79–85). It is interesting that there continue to be no villas known on the Thames gravels, perhaps because the lower Thames terraces are more acidic (Poulton 2009, 20). The only hint of an exception is at Shepperton, east of Chertsey: a supposed tessellated pavement and a scatter of more recent evidence. The nearby find of a nest of pewter plates is perhaps also relevant (Longley and Poulton 1982, 184; Poulton and Scott 1993). Curiously there is otherwise very little sign of Roman-period activity in the whole of the big southern loop of the Thames south of the Brentford-Staines road except close to the latter. Was the area given over to sheep farming (implied for a later period by the place-name) and exploitation of the resources of the river, using fish weirs (cf. Bird 1999)?

Otherwise there is a general scatter of settlement evidence along the corridor marked by the gravel terraces and alluvium of the Thames and into the adjoining river corridors, but only in the Staines area does there seem to be a concentration. Poulton provides a useful summary and notes widespread evidence in Staines itself for grain processing as well as hay storage, butchery, tanning and leatherworking (Poulton 2009, 21; cf. McKinley 2004, 25–8; 48; 54), all presumably reliant on supplies from the surrounding farms. Even here there is a sense of dispersed individual farms rather than densely packed settlement in the countryside. This impression is reinforced by those excavations in the area and further east along the Thames

corridor that have produced little or no evidence for Roman-period activity. For example, there was very little from the site at Stanwell (O'Connell 1990, 54), or at the Ashford Hospital site (Cowie 2008) or Staines Road Farm in Shepperton (Jones 2008). Large sites near Laleham also seemed to be largely empty of Roman material: there was very little at the 60ha of Home Farm, or in 149 evaluation trenches at Manor Farm (Bird 2004b, 69; Howe *et al.* 2011, 280–1).

Environmental evidence from Thorpe Lea implies an open landscape around the site (Hayman and Poulton 2009, 187), while at the Manor Farm, Laleham site it is suggested that as Roman and medieval finds and deposits were very few, 'the area was probably used as farmland in those periods'. This may well be correct, but the apparent lack of subdivisions might seem odd. Perhaps we should allow for open pasture and some woodland. While the town at Staines presumably imported its fuel and timber from further afield – no doubt from the nearby London Clay areas, individual farms were perhaps more likely to want their own local supply. There is some evidence suggestive of woodland close to settlements near to Kingston and on the gravels east of London (Austin *et al.* 2005, 182); Howell *et al.* 2011, 63).

On the Bagshot Beds little settlement is recorded; occupation in the Bagshot area is probably related to the Windle Brook and may be concerned with ironworking (Bird 2004a, 100). Surprisingly little has been recorded along the Blackwater (perhaps significantly, the western county boundary) except around its southern end near Tongham and Runfold. Sites near Woking are probably to be explained as in the Wey corridor (*e.g.* Hawkins 1984; 1985), as are those north of Guildford on or near the London Clay (Lambert 2012, 37). The latter may be linked in some way to the villa at Barnwood School west of Guildford (Poulton 2005) and the enigmatic site at Flexford.

Settlement in north-east Surrey was probably also sparse. The Roman Rural Settlement Project has matched Roman finds against excavations carried out in this area which demonstrates that this is not a factor of losses to suburban development (Martyn Allen in lecture, March 2015). It is probable that this was mostly an area of woodland managed to provide fuel and timber for the London market (Bird 2004a, 87–8). Recorded settlement tends to favour the Hogsmill (*e.g.* Old Malden: Andrews, 2001, 217–9; *cf.* Cotton 2001, 38) and Wandle corridors and the northern edge of the Downs, as with the villas at

Beddington and (probably) Carshalton (Howell 2005; Bird 2004a, 104–6). The villa at Ashted is clearly exceptional in its setting on the London Clay, perhaps to be explained by its important tileworks (Bird 2004a, 117–18), although recent discoveries indicate that continuity from a prehistoric earthwork site must also be a factor.

There is so far surprisingly little evidence for occupation along the spring line north of the Downs (Bird 2004a, 81). The siting of the cluster of villas on the Downs in the area around Walton-on-the-Hill also requires explanation. Is it possible that here better soils arising from the surface deposits were degraded by agriculture, leading to the development of heathland? The Walton Heath villa may have been early and quite grand (Bird 2004a, 101, 115) which would normally imply an owner with the ability to create a surplus to generate wealth. Perhaps the farming of animals is an alternative. It is reasonable to postulate sheep farming on the Downs near Ewell, but there they are clear of surface deposits (Bird 1996, 224–5). Also on the clearer Downs some evidence for possibly Iron Age to Roman-period field systems has long been noted in the Mickleham area, near Leatherhead, and on Farthing Downs in Coulsdon, south of Croydon (Hope-Taylor 1949).

As early as the later 19th century Leveson-Gower noted the attraction to Roman-period settlement of the line south of the Downs, from Titsey to Farnham (Anon 1880, liv), thus mostly associated with the ‘fertile greensand belt’. A number of villas are known or can be postulated (Bird 2004a, 82–3). Probably representative of more general non-villa settlement is a recently discovered enclosed site at Battlebridge Lane, Merstham (Saunders and Weaver 2012). Along the line, most of the evidence suggests small villas and farms and at present only Abinger looks likely to be a large villa, possibly benefitting from an estate that included a sizeable part of the Tillingbourne valley (Bird 2004a, 85–6). It probably continued on from a reasonably high status Iron Age predecessor (recent excavations). There may have been a large villa complex at Dorking, in a parallel location to Bignor, rather than a roadside settlement as is usually assumed (Bird 2004a, 63–4). A wider spread of settlement, probably related to the Wey corridor, in the area south of the chalk ridge of the Hogs Back in the west of the county, was studied over 50 years ago by Clark and Nichols (1960) and is perhaps now ripe for reappraisal.

There is little evidence for settlement in the south-west corner of

the county away from the Wey, which makes the large building complex at Chiddingfold stand out. It may have been a ritual centre, or become one in the Roman period (Graham and Graham 2011, 188–9). The site can now be seen to have prehistoric origins (Fig. 6.2). Further east there is so far little indication of occupation sites on the Weald Clay, even where Roman roads cut across it, except where the Mole corridor meanders southward to the county boundary. Here good evidence for settlement has recently been recorded in the area north of Horley (e.g. Howe *et al.* 2011, 276–8; 2014, 248).

Enclosures

The best non-villa settlement evidence so far recorded in Surrey comes mostly from the sands and gravels. The Roman Rural Settlement Project has located few complex farming settlements in the county, and indeed in the South-East as a whole. Hengrove Farm near Staines is a very good example of the type; perhaps Wey Manor Farm was similar (Fig. 6.3). These enclosures are considered to have been intended for stock management.

Most of the other evidence is for enclosed farms as at Thorpe Lea Nurseries (Fig. 6.4). In the Staines area there are many scraps of evidence suggestive of settlement or at least land management. The Roman-period ditches at the Yeoveney Neolithic causewayed camp site near Staines suffered restricted excavation as resources were limited but they seem to have included an enclosure reminiscent of the one at Thorpe Lea (Robertson-Mackay 1987, 29–30; 41). Sometimes there is sufficient evidence to suggest the existence of the sub-rectangular enclosures that seem to be quite common, as at Ashford Prison (Carew *et al.* 2006). Some can now be recognised elsewhere in the county, for example at Battlebridge Lane (Fig. 6.5); in the area to the north of Horley (Howe *et al.* 2011, 277 fig. 5); Queen Elizabeth Park, north of Guildford (Fig. 6.5); and perhaps Monkton near Farnham (Priestley-Bell forthcoming). Runfold to the east of Farnham has some similarities to Thorpe Lea (Fig. 6.6).

Geophysical survey has identified part of the Roman-period landscape around the Abinger villa, with a layout of rectangular fields (the date confirmed by excavation). At this site and at Chiddingfold, survey followed by excavation has also recorded pre-Roman enclosures, away from the gravel or alluvial soils, that may have continued in use into the Roman period (Fig. 6.2). A small earthwork enclosure partially recorded in the 1950s (Little 1961, 38, fig.2) near

Sanderstead (south of Croydon) may also be relevant in this context as it has associated Roman material.

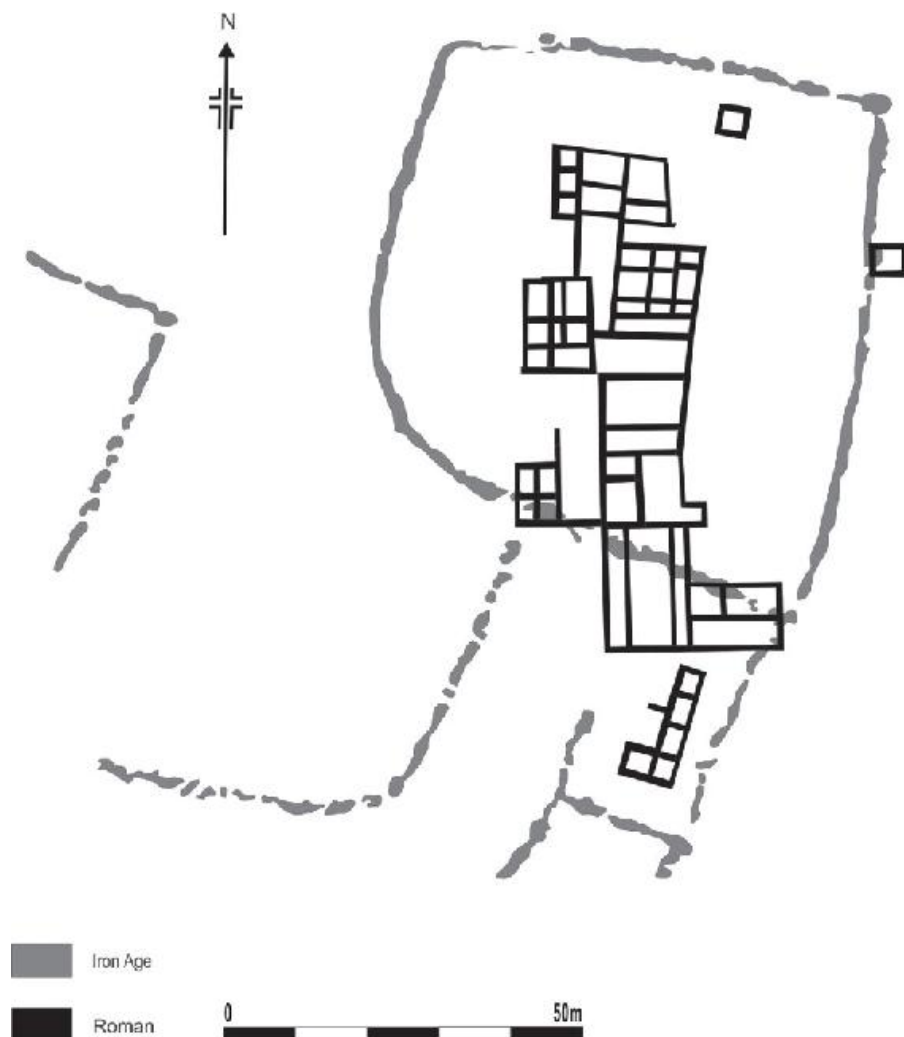
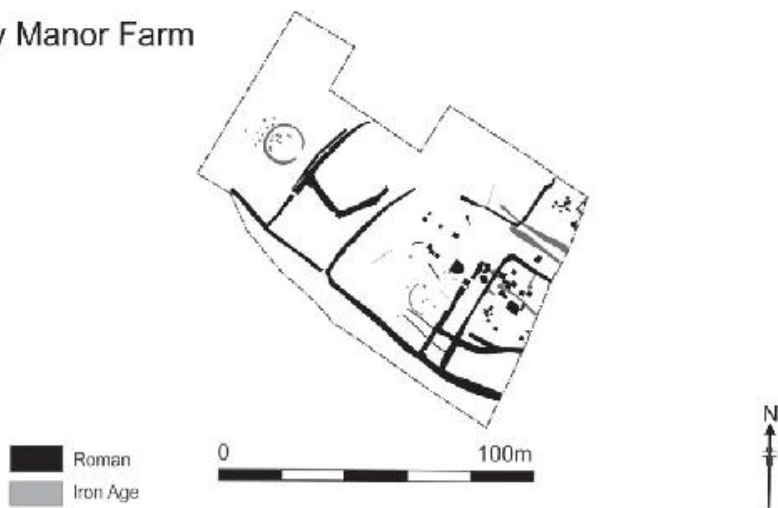


Fig. 6.2: Chiddingfold: late Iron Age enclosures identified by geophysical survey and selective excavation with the likely position of the buildings recorded in the later 19th century superimposed. (Simplified plan after Graham and Graham 2011, 180, fig. 3; illustration by Alan Hall).

A curious feature recorded at the Barnwood villa site near Guildford should be noted (Fig. 6.7). An enclosure effectively attached to the main building on the site has two sides lined with posts of ‘surprisingly large dimensions’ if they were for fences; a need for strong animal control is postulated. The site has small enclosures probably related to stock control, and the processing of animal products is suggested as a use for the later building although

unfortunately the bone evidence is not very good from the site (Poulton 2005, 46, 69, 85). Possibly relevant is a line of eleven postholes with packing recorded at Beddington which also look rather strong for just a fence, although they do not seem to relate to anything else (Howell 2005, 40, fig. 41, 44).

Wey Manor Farm



Hengrove Farm, Staines

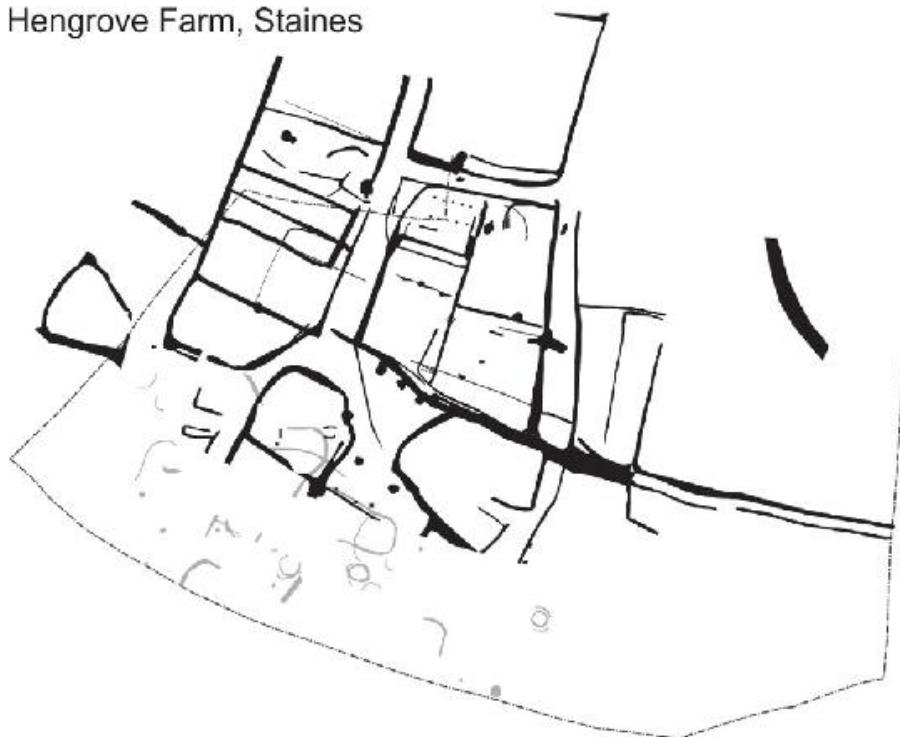


Fig. 6.3: Enclosures at Hengrove Farm, Staines and Wey Manor Farm. (Simplified plans after Booth et al. 2007, 45, fig. 3.3, 68, fig. 3.15; illustration by Alan Hall).

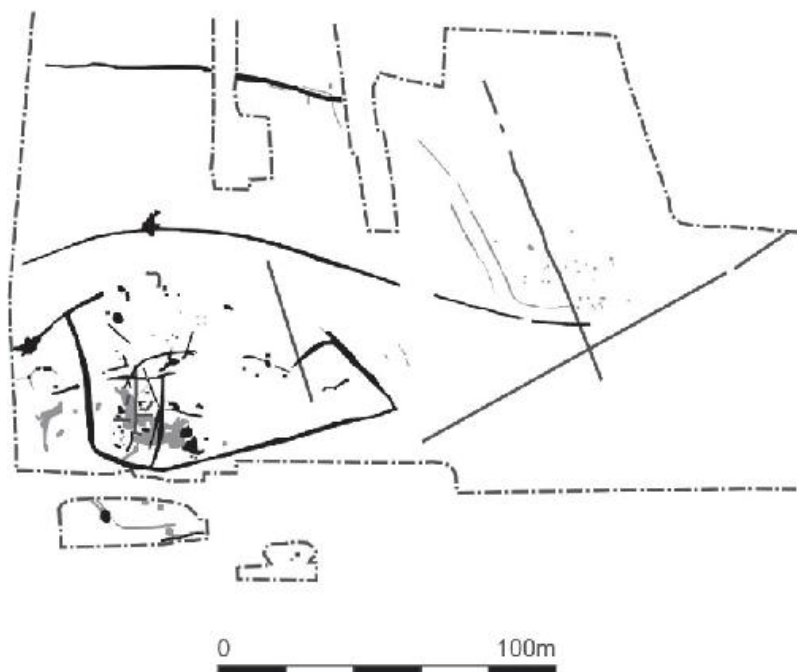


Fig. 6.4: Thorpe Lea Nurseries, Iron Age and Roman features. (Simplified plan after Poulton 2004, 62, fig. 4.8; illustration by Alan Hall).

Buildings and structures

Although an increasing number of farms are known in Surrey, comparatively few buildings have been recorded. Even at villa sites ancillary buildings have only been found in recent years. Some of these were stone-founded but others were only of timber, which must have been the norm. It is clear that most buildings in the county were surface-built box-frame constructions which have left hardly any trace in the soil unless there are special circumstances, as with the small early structure B3 at Rapsley, which burnt down and was sealed beneath later buildings (Hanworth 1968, 8), and the chalk-floored structure now known to have preceded Lowther's villa 'house' at Ashted (Booth 2011, 392). With few exceptions otherwise, including traces of round houses, timber structures have only been found when posts were needed, such as four-posters (e.g. Poulton 2009, 20) and the nave posts of aisled buildings.

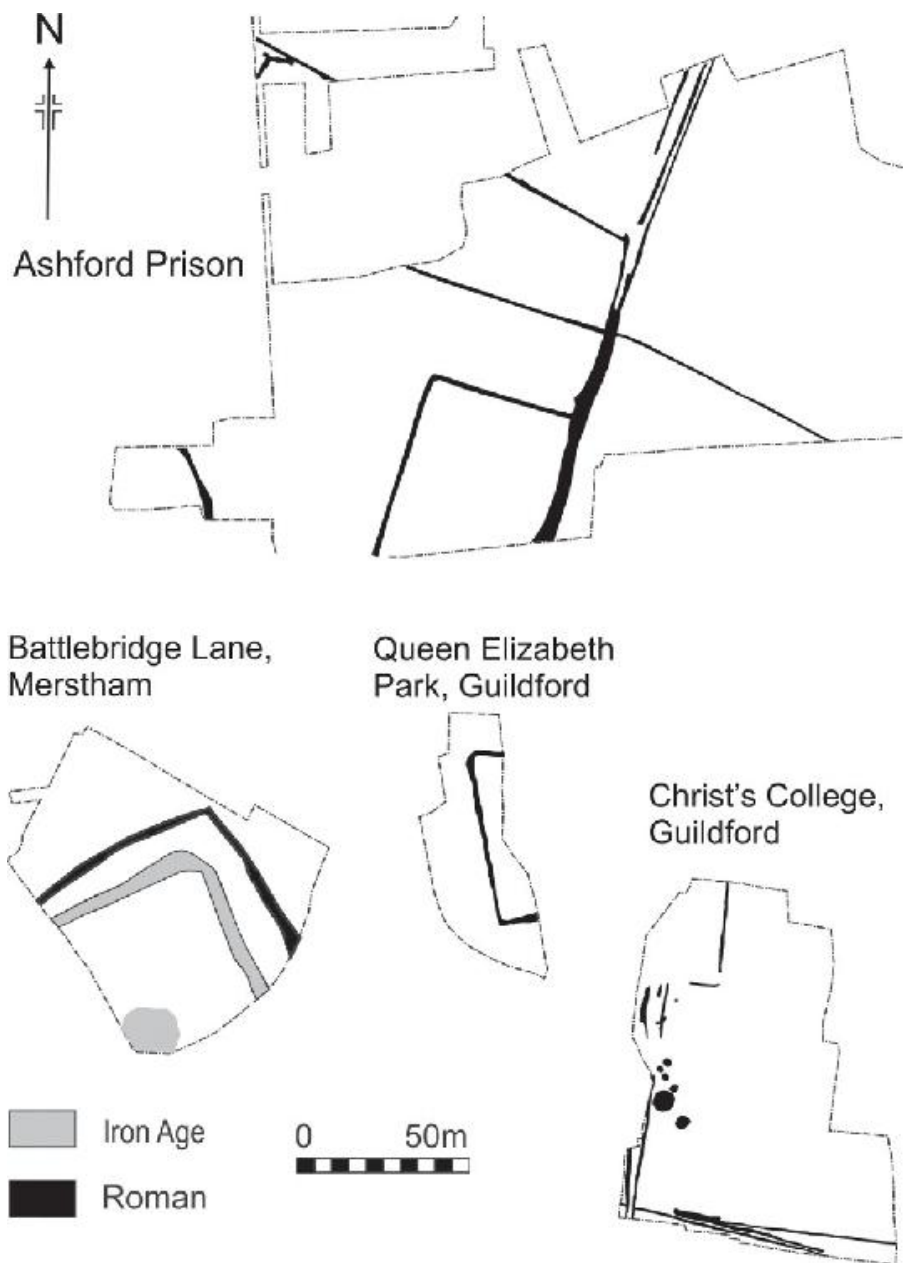


Fig. 6.5: Simplified plans of selected enclosures. Ashford Prison (after Carew et al. 2006); Battlebridge Lane, Merstham (after Saunders and Weaver 2012, 6, fig. 2.2); Queen Elizabeth Park, Guildford (after Deeves 2002); Christ's College, Guildford (after Lambert 2012, 11, fig. 8). (Illustration by Alan Hall).

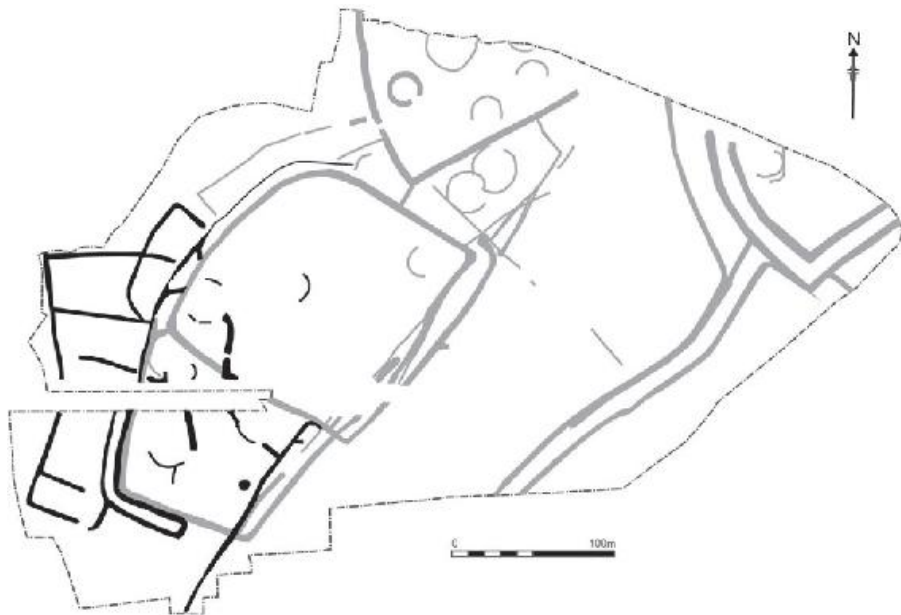


Fig. 6.6: Simplified plan of enclosures at Runfold; key to date as in Fig. 6.5 (after Poulton 2004, 56, fig. 4.4; illustration by Alan Hall).

A good example is the Thorpe Lea site, where there is plenty of occupation evidence but no recognisable buildings except for a possible four-post structure (Fig. 6.4; Hayman and Poulton 2009, 191–2). A similar result on a different subsoil can be seen on the Atwood site near Sanderstead (Batchelor 1990). And apart from a probable aisled building (see below), no major buildings were identified in the extensive excavations at Hengrove. Yet such an establishment would have required a sizeable workforce to carry out such activities as ditch digging and maintenance, care of animals and care of the workforce itself, and these would all have needed lodging and workshops.

Aisled structures have now been recognised at a number of sites, occurring at nucleated settlements, villa sites and complex enclosures. Examples at Rapsley, Barnwood and Beddington have stone foundations for outer walls but most survive as just two rows of posts, with no evidence for the outer walls at all. There is, however, little doubt that they were aisled structures, with now invisible outer walls of timber in the same tradition as the missing domestic buildings.

barn-like structures' at the King William IV site in Ewell, near a probable corn drier (Orton 1997, 118). There are some possible lines of post holes. There may also be part of another post-built structure at Glyn House nearby (Stansbie and Score 2004, 194–7). At Flexford, two double lines of post holes have been traced that may well be two successive aisled buildings, the second perhaps constructed at one step to the side to ensure that the new posts were in undisturbed ground (Howe *et al.* 2014, 238–41). Another post-only aisled structure, with ten substantial posts, can be seen within the complex of enclosures at Hengrove (Fig 6.3; Poulton 2009, 17, 19, fig. 1.15).

At Beddington, the probable sequence has one building succeeding another at right angles (B6 and B7); they may be contemporary but seem to be too close. They were certainly replaced by another building (B8) with stone-founded outer walls and post pads, in contrast to the earlier ones which are marked only by the aisle posts apart from the southern end of B7. It is noticeable that even the 'real' outer wall of B8 is only partially present (Howell 2005, 27, fig. 30, 35, 40, fig. 41). The Barnwood School site also produced evidence for a probable aisled building marked out by two lines of posts, about 6m apart as at Beddington. It was later replaced at right angles by a stone-founded structure that seems to have been aisled and to have had an unusual tower-like structure (Fig 6.7). These buildings are thought to be part of the complex surrounding a villa found in 1829 ((Poulton 2005, 36, fig. 3, fig. 4 opp. 38, 39–41). A hint of a possible aisled building is suggested at Chiddingfold, but only one substantial post and some flint surfacing is known (Graham and Graham 2011, 179–81). As it may be early it could be seen as placed to the left front of the small probably early building on the site (Fig. 6.2), in a similar position to those at Beddington and elsewhere. At Rapsley the first aisled building is seen as domestic originally (the later house being then a bath-house). It was rebuilt after a collapse and another one was constructed, partly founded on the farmyard wall. Again a roughly 6m width for the 'nave' is to be noted (Hanworth 1965, 9–30).

The purpose of these buildings is a matter of conjecture, although their importance is marked by the way they often occur in sequence. At Barnwood, Poulton (2005, 82–3) suggests a link to agricultural activity, noting a corn drier and the possibility that the postulated tower was intended for grain storage, but it is thought that the adjacent enclosure may have been for stock so perhaps there were multiple uses. The Hengrove settlement is seen as intended for stock

management. One of the Rapsley buildings is seen as a workshop (Hanworth 1965, 24) while at Beddington use as barns is suggested – but largely on the basis that there is no obvious evidence for workshop activity (Howell 2005, 32–5). No doubt these structures were used for a variety of functions, probably several at the same time. Walls parallel to the ends of Beddington building B8 and the later building at Barnwood perhaps suggest the existence of loading platforms (Howell 2005, 41–2; Poulton 2005, 44 and 83).

Crops and animals

Although more evidence has become available, there is still insufficient for much advance on the conjectures about crops and animals in Surrey written some years ago (Bird 2004, 87–90). It remains the case that the evidence is biased and far too limited to serve as the basis for meaningful generalisations.

Some recently-gathered evidence may be noted. Grain storage pits are known from some sites that continued in use from the Iron Age. These include Carshalton War Memorial Hospital and The Looe, east of Ewell, on the chalk, and Abinger and Charterhouse, on the Greensand. Usually there are also signs of ritual backfilling (Killock 2012; Cotton 2001; Harrison 1961). Finds at the roadside settlement at Staines included bread wheat, barley, emmer wheat, rye and oats, also peas and field beans. It is also worth drawing attention to the evidence from this site for the use of wild food sources such as bramble, dog rose, sloe, wild plum and elder, no doubt representative for settlement sites of all kinds (McKinley 2004, 23, 28). At Kingston (Skerne Road), spelt wheat and barley are recorded, and a relatively high number of oat grains which might suggest a deliberately grown crop (Austin *et al.* 2005). The RAF Chessington site had spelt wheat and evidence for barley processing. Interestingly the presence of Mayweed is seen as related to the expansion of agriculture onto heavier clay soils (Letts 2003). Mayweed was also noted at Old Malden, together with spelt and bread wheat (Hinton 2001, 198, 200). Weeds found at Hurst Park, near Molesey, also led to the suggestion of arable on heavier soils (though the site itself is on river gravel), and spelt wheat, some bread wheat and barley were found in association with a possible corn drier (Andrews 1996, 102–3). At Beddington there was evidence for cereals, especially spelt and some barley (de Moulins 2005, 101–13). Crop processing recorded in Croydon was mainly of spelt but also barley, rye and oats (Taylor 2011, 210–11).

The presence of corn driers is suggested at Staines, Kingston, Beddington and Croydon, based on the information noted above, but other sites as well as Hurst Park have now produced evidence for the structures themselves. A probable stone-built corn drier is known in Ewell, near the postulated barns already mentioned (Orton 1997, 118). A similar structure was found at Farleigh Court, on the Downs south of Croydon (Fig. 6.8) and can be paralleled by one at Northfleet in Kent, which was interpreted as a malting kiln (Biddulph 2011, 184–5). Excavations at the Coldharbour Quarry, Thorpe, south of Staines, produced evidence for a probable T-shaped corn drier (Howe *et al.* 2008, 366) and another is known from the Barnwood ‘tower’ building (Poulton 2005, 41–3).

The widespread evidence in Staines for butchery, tanning and leatherworking (Jones and Poulton 2010, 26–7) presumably implies the farming of the relevant animals locally, perhaps at sites like Hengrove Farm, and there is evidence for hay being gathered locally for winter feed and bedding (McKinley 2004, 25–6). In general, however, as already noted, bone survival in Surrey is not good. Thus at Beddington it is possible to suggest that oxen and sheep were the most important animals, and that there were pigs and horses, but the specialists are forced to note that bone recovery and analysis was difficult (Pipe and Locker 2005).

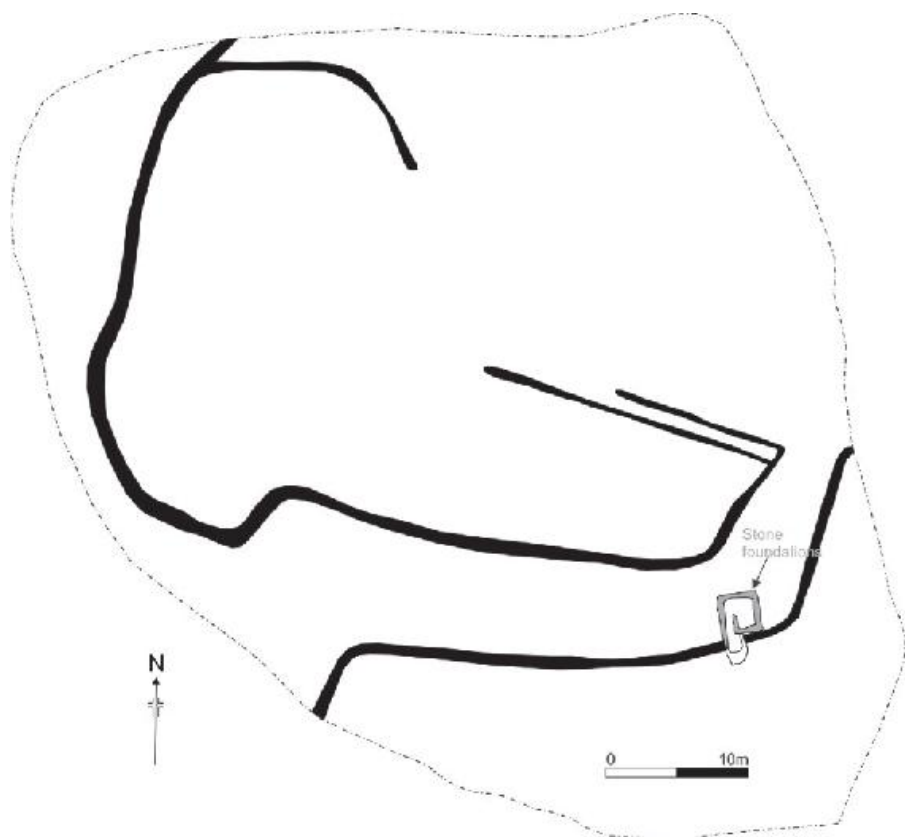


Fig. 6.8: Farleigh Court. Simplified plan of enclosure and corn-drying oven (illustration by Alan Hall, after information supplied by Surrey County Archaeological Unit).

Recent discoveries are gradually improving the picture, but for the moment it must be accepted that there is insufficient evidence to do much more than speculate. As well as the products of woodland, especially in the north-eastern corner, the county might well have been an important area for animal production, making the most of the poor soils. There may for example have been sheep on the heathlands and on those parts of the Downs clear of the worst of the surface deposits (Bird 2004a, 89–90); they have also been suggested above for the Shepperton area. Cattle-rearing was postulated from the limited evidence at Rapsley (Hanworth 1968, 32), and to judge by an observation of Charles Darwin's about heathland near Farnham, browsing cattle could have been one way in which the county's heaths were used and kept clear (Burrow 1968, 123–4). There are slight grounds for suggesting the use of the Clay with Flints for pig farming (Bird 1996, 224) and a major question is whether or not there was transhumance into the Weald – and if so for what animals: cattle,

pigs? (*cf.* Bird, South-East, this volume). In Surrey, the practice is assumed for the Iron Age (*e.g.* Cotton 2001, 38; Poulton 2004, 60) and is well-attested for the Saxon period (Blair 1991, 14–17).

Settlement history

The chronological development of countryside settlement in Surrey in the Roman period is becoming clearer. In general terms it may be more meaningful to talk of the late Iron Age/early Roman period followed by the later Roman/early ‘Saxon’ period with marked change roughly in the middle, from around AD 200.

Much better evidence is now available for continuity across the artificial boundary of AD 43. Of particular interest are recent discoveries at Chiddingfold (Fig. 6.2), Abinger and Ashted, all suggesting continuity of occupation from Iron Age earthwork enclosures to Roman villas. The last two sites demonstrate the importance of studying areas around the villas as the Iron Age sites are slightly removed from the later buildings. Research around other villa sites is now called for, and conversely the enclosure at Westcott, once thought of as a marching camp but now seen as Iron Age in date, may suggest a nearby villa (Bird 2004, 73). In view of the new understanding of the development of the Ashted site, the areas near the Old Malden and Kingswood enclosures, both with Iron Age to Roman evidence, must also be of interest in this context (Andrews 2001, 219; Little 1961). So too must the suggestion that production of querns at Worms Heath, near Chelsham, began pre-conquest as an outlier of a Gallo-Roman industry (Green, this volume).

It seems that there is little evidence in the areas of gravel and alluvium for this development from earthwork to villa. Beddington is a possible exception: there are Iron Age enclosures, reminiscent of those noted above for the early Roman period, on the site later occupied by the villa (Howell 2005, 12–20). Elsewhere non-villa settlement also demonstrates considerable evidence for continuity. This is well demonstrated near Beddington, in the Carshalton area (Killock 2012). Further west, at Brooklands, just one of three Iron Age sites shows continuity into the Roman period, perhaps suggesting a degree of consolidation of holdings (Poulton 2009, 17). The Hengrove site had an Iron Age beginning, as did Wey Manor Farm and Thorpe Lea Nurseries (Figs 6.3 and 6.4). At Fairylands, Laleham there was good late Iron Age to Roman evidence although the focus of the settlement probably shifted (Taylor-Wilson 2002, 148). Like Thorpe

Lea, the Runfold site shows Roman period features echoing the Iron Age layout (Fig. 6.6). The Monkton Lane site also near Farnham has a possible Iron Age to Roman enclosure and related evidence (Priestley-Bell forthcoming).

There is also now more evidence for continuity on non-villa sites in other areas. At Battlebridge Lane, Merstham, the layout of enclosures develops from late Iron Age into Roman (Fig. 6.5). Sites such as The Looe, near Ewell, and two school sites, St. Andrews and St. Johns, near Leatherhead, all have finds and features showing continuity (Cotton 2001; Priestley-Bell 2014; Howe *et al.* 2014, 245). Woodlands Park in this area should also be noted (Hall and Stanley 2008), as well as the evidence for Roman-period occupation at the Anstiebury hillfort (Hayman 2008a, 205). The sites at Old Malden and Sanderstead are noted above.

Lowther (1938, 132) commented that a site near Byfleet was ‘little affected ... by “Romanization”’, but the finds included a mortarium (of ‘light buff ware’) and a flagon of red ware with cream slip. It seems to be common for apparently non-villa sites to include at least some more ‘Roman’ pottery. Representative examples would be the samian recorded at Thorpe Lea (Jones 2009b, 143), at the Wokingpark Farm site (Hawkins 1985), at the ‘village’ noted by Hope-Taylor (1949, 70) near Woodplace Farm below Farthing Downs, and at the Kings Wood, Sanderstead site (Little 1961, 39). Together with other finds this material presumably has some implications for the degree of adoption of a changing lifestyle.

There appears to be considerable change in the countryside starting from around AD 200. Several of the sites with late Iron Age to early Roman dating do not seem to continue into the later Roman period. Some that do, such as Flexford, appear to change character (David Calow pers. comm.). There may be several reasons and in some cases it may be no more than a change of settlement focus but there does seem to be a decline in settlement according to currently available evidence (see Fulford and Allen, and Bird, South-East, this volume).

At Flexford there is a change of alignment and some ditches seem to be deliberately filled with rubbish indicating that they are going out of use (Howe *et al.* 2014, 238–41). At Abinger too it seems that the field ditches were being infilled (Booth 2011, 391). Conversely, the Christ’s College site north of Guildford seems to be only of later Roman date (Lambert 2012, 37). Poulton (2009, 20–1) suggests a change to more pastoralism for the area around Staines, which chimes

with the Roman Rural Settlement Project evidence for an increased emphasis on cattle in the South-East (Martyn Allen pers. comm.).

At Staines itself there seems to be something of a 3rd-century hiatus, with evidence for problems with flooding (Bird 2004a, 58). The villa and tile kiln at Ashted both show evidence for a deliberate raising of levels, presumably to be explained as a response to wet weather, which badly affects this site on the London Clay (Booth 2011, 392). Ashted was a major industrial complex probably for over a hundred years (Bird 2014), but it seems to have been abandoned in the early 3rd century, the villa itself possibly being replaced by another on drier soils to the south, near the parish church (Lowther 1934, 84). Similarly, it has been suggested that the Wyphurst villa was abandoned at the end of the 2nd or beginning of the 3rd centuries and replaced by buildings at Rapsley, which again would be a drier site (Hayman 2008b, 289–90). Perhaps a generally wetter trend in the weather was one reason for the mid-Roman changes. As this does not entirely match with the wider picture (see Dark, this volume), perhaps it affected some areas more than others.

The later Roman period and the transition from ‘Roman’ to ‘Saxon’ is ripe for reappraisal in Surrey and the South-East generally, and only a few comments can be offered here. The villa at Rapsley was probably abandoned by about AD 330, but not before a high quality Cologne glass vessel hardly paralleled in this country could reach the site (Harden 1965). The discovery of early 5th-century Roman coinage at Flexford (David Calow, pers. comm; identifications by Sam Moorhead) and other unusual finds for such a site, like *bustum* burials, an inscribed copper alloy vessel (Tomlin 2014, 452), and the apparently unique Rheinzabern samian patera dating to the late 3rd or early 4th century (Bird 2015, 45–50) all suggest that the site had unusual influences or connections. Were these military connections? The site producing the late Portchester D ware at Overwey near Tilford is not far to the west (*cf.* Gerrard 2014, 96 (Overwey is in Surrey, not Hampshire)). This all throws into focus the early Saxon cemetery at Guildown next to Guildford (about 5km from Flexford as the crow flies), which is notably isolated from early Saxon sites to east and west but could be seen as controlling the connection between them (Harrington and Welch 2014, 192). The presence of part of a late Roman military belt set in grave 78 (*ibid.* 2014, 167) is therefore very noteworthy, as is the way it stands out as the only early grave to be aligned north–south (Lowther 1931, plan opp. 1). It may be no

more than coincidence that a grave on the edge of the Croydon Saxon cemetery, radiocarbon dated to the very late Roman (or sub-Roman) period, is also at right angles to the others, but this cemetery too has produced parts of late Roman military belt fittings (not from that particular grave), as well as a mixture of objects and burial practices, Frankish, Jutish, Saxon and so on (McKinley 2003, 10–12, 109–10).

These tenuous hints might suggest that the ‘Saxons’ grew out of later Roman military arrangements whereby mostly Germanic officers with crossbow brooches and some armed and experienced followers built on the control they already had and their own links back to the Continent (*cf.* Bird 2012, 89–90). The early juxtaposition with British-speaking communities might in turn explain the survival of British words in some areas such as north-east Surrey (Gelling 1993, 51; Bird 2004a, 172, fig. 84). The model would also help to explain the way in which Surrey’s ‘Saxon’ finds usually occur close to Roman sites and the way our evidence for significant changes to the countryside seem to date to later than the sub-Roman period, presumably when a new, reasonably permanent, political system had come into being.

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Chapter 7

Market Forces – A Discussion of Crop Husbandry, Horticulture and Trade in Plant Resources in Southern England

Gill Campbell

Introduction

This paper discusses the archaeobotanical dataset from southern England focusing on the counties of Kent, Surrey and East and West Sussex, exploring how the means of preservation, recovery techniques, and the nature of the archaeology excavated have constrained and influenced our understanding of plant utilisation in the Roman period.

It also briefly examines how far Martin Jones' hypothesis (1981) still holds true, with the 1st century BC to 1st century AD seen as a period of agricultural innovation, followed by a period of stagnation from the end of the 1st to the 3rd century AD with further innovation occurring from the 3rd to 4th century AD. In addition, it will attempt to contextualise recent studies by Marijke van der Veen and fellow researchers (2008) which see the incorporation of Britain into the Roman Empire as resulting in three major developments in terms of food:

- the creation of new consumers
- the consumption of new plant foods
- the development of horticulture.

The nature of the evidence

Evidence concerning the use of plant resources in Roman Britain comes principally in the form of macroscopic plant remains (seeds, fruits, buds, etc.) preserved either through charring, mineralisation or as a result of anoxic conditions. Pollen evidence also provides some data although many pollen grains cannot be identified beyond a particular group of species (e.g. *Anthemis* type) or in some cases only to family level (e.g. *Chenopodiaceae*) (Moore *et al.* 1991). Further information is also provided in surviving texts, most notably the Vindolanda tablets where some food stuffs are listed (Bowman 1994, 67–70). A number of techniques can now also be used to study ancient

lipids either preserved within the fabric of ceramic vessels or within residues such as tar, to discover how plants were used. Thus the use of birch bark tar as an adhesive to repair an Ecton Ware Jar from West Cotton, Northamptonshire has been demonstrated by Charters *et al.* (1993) whilst plant starch was shown to be one of the components of a cream found within a tin canister recovered from Tabard Square, Southwark (Evershed *et al.* 2004; Durrani 2004).

Nearly all archaeological sites of any period produce charred macroscopic plant remains in some form, even if only charcoal. This is because once the material becomes charred, it consists principally of carbon which is resistant to chemical and biological attack, though subject to mechanical damage. In some cases, high temperature fires where there is good supply of oxygen result in all the carbon being burnt off, leaving behind portions of plants composed principally of silica (Campbell *et al.* 2011; Robinson and Straker 1991).

While the temperature and length of burning influence how well and what portion of a plant is preserved (Boardman and Jones 1990), preservation of charred plant remains is affected by the length of time the material is exposed on the surface, the degree of protection afforded by overlying deposits (depth of burial) and also to a certain extent the age of the deposits (Hillman 1981, 140), and delicate items, such as buds, are only recovered where burial is rapid such as the dumping of material into deep pits. At the same time charred plant remains are only present because they have been burnt, either deliberately or accidentally, and therefore these assemblages largely reflect material used as fuel or disposed of by burning, or the remains of plants such as cereals where the use of fire is involved in preparing the crop for human consumption, for example the drying of cereal grain prior to grinding it into flour.

In contrast plant remains that are preserved as a result of anoxic conditions, such as those recovered from the fills of wells or ditches that have remained permanently waterlogged since or soon after deposition, give a much better idea of local vegetation and/or the types of fruits, vegetables and herbs used, as they do not have to have been burnt to be preserved. However, even within these deposits some parts of plants are more readily identifiable to a particular species than others, for example seeds as opposed to leaves and stems, whilst the composition of different seeds and fruits means that some survive better than others. For example the woody seeds of blackberry and fruit-stones of plums etc. survive even where deposits have

experienced some drying out whereas legumes are only recovered under exceptional conditions.

Some plant remains are also preserved through mineralisation. This can take two forms, either the replacement of organic material by minerals, normally calcium phosphate (mineral-replaced), or the preservation of the material due to the presence of toxic compounds from metal corrosion (mineral preserved). Mineral-preserved remains are principally found within burials, for example box leaves were found within a lead coffin excavated at Cann, Dorset (Reid 1918). Mineral replacement occurs where soluble phosphates or carbonates are present and where there is sufficient water present to allow their transport into soft tissues. It occurs in deposits containing faecal material and whilst a few years ago it was considered relatively rare on Roman sites in Britain, the number of sites from which mineral-replaced remains have been recovered is gradually increasing (see Campbell 2008; Stevens 2011a; Robinson 2011a). Other methods by which plant remains can be preserved are through desiccation, soot blackening and as trace fossils or impressions. Both desiccation and soot blackening are only encountered in Britain within buildings, and the number of impressions indicating specific plants, as opposed to the presence of straw and wood, is very low (van der Veen *et al.* 2007).

In addition to considering the effect that different modes of preservation have upon the archaeobotanical record, the constraints imposed by the nature of the archaeology and differing methods of sampling and recovery need to be considered. Sampling programmes involving the recovery of charred plant remains by flotation have been part of most archaeological projects since the late 1970s. However, in many cases the number of samples analysed from each site is small and the range of contexts sampled limited, with corn-drying ovens and ditches featuring prominently. This is partly related to the tendency for excavators before the 1980s and in some cases well into the 1990s to only sample from those contexts where charred grain was visible during excavation, where deposits appeared ashy or rich in charcoal (organic), or where a particular type of feature was known to produce charred plant remains (e.g. corn-drying ovens). The problem with this approach is that the archaeobotanical record has become swamped with data from a restricted range of feature types leading to a somewhat biased picture. For example corn-drying ovens almost always contain evidence for the drying of spelt wheat (see below) and this can lead to the impression that spelt wheat was the principal crop

and that other cereals were of minor importance. However, when assemblages from other types of feature are taken into account a rather different picture emerges. For example while the assemblage from a corn-drying oven at Crookhorn, Hampshire, largely consisted of wheat grain, the ditches from Owslebury, Hampshire produced mainly barley. Similarly, dumps within ditches analysed from sites within the Danebury Environs Roman Programme were far richer in barley than those from other contexts (Murphy 1977; Campbell 2008).

Another factor which influences the archaeobotanical dataset is the tendency for excavation to focus on recovering the plan and development of Roman buildings at a settlement as opposed to features such as pits and ditches in the periphery of the settlement or in areas adjacent to the buildings. This can mean that whilst well-sealed deposits are available for sampling from the final phases of occupation and from features pre-dating the principal buildings, there may be very few samples that relate to the main occupation phases because deposits containing rubbish from these phases were not encountered within the area excavated. This may in part explain why in the review by van der Veen *et al.* (2007) there are nearly twice as many archaeobotanical records from rural sites dating to the early Roman and late Roman period (1st or early 2nd century AD and late 3rd and 4th century AD) as compared with the middle Roman period (2nd and 3rd centuries AD).

At the same time the propensity for well digging and the construction of large deep ditches in low-lying areas such as river floodplains by Romano-British people coupled with an increase in intensity of occupation and consequent rubbish generation means that the number of permanently waterlogged (anoxic deposits) is far greater for this period than for the preceding Iron Age, although there are notable exceptions, such as the waterlogged features associated with the oppidum of Silchester (Lodwick 2014). Furthermore the evidence is not evenly distributed across different site types, with waterlogged features more often found within towns and military sites, as well as some high-status rural sites (van der Veen *et al.* 2007).

Crop husbandry

Cereals

The main cereals grown in central and southern England during the Roman period were spelt wheat (*Triticum spelta* L.) and hulled six-row barley (*Hordeum vulgare* L.) with numerous records for both crops

recovered across the region from the 1st to the end of the 4th century AD (Greig 1991; Campbell 2003; Giorgi and Stafford 2006). There are however subtle regional and local differences in terms of the range of crops grown. The cultivation of emmer wheat (*Triticum dicoccum* Schübl.) is a case in point. Low numbers of emmer wheat remains in association with greater numbers of spelt wheat remains are a feature of Roman sites in the Upper Thames Valley, for example Barton Court Farm (Jones 1984), Claydon Pike (Straker 2007), and Ashville Trading Estate (Jones 1978). Whereas, on the Hampshire Downs, emmer is only rarely recovered and was probably only present as a contaminant within the spelt wheat crop (Campbell 2008).

In Kent there is good evidence for emmer being a crop in its own right throughout the Iron Age, from sites such as White Horse Stone (Giorgi 2006a), West Malling and Leybourne Bypass (Stevens 2009a), the A2/A282 Improvement Scheme (Smith 2011a), Wilmington Gravel Pit (Hillman 1982), Saltwood Tunnel (Stevens 2006a), Eythorne Street (Davis 2006a), Church Whitfield (Campbell 2014), Shelford Farm Estate (Carruthers and Allison 2010), and Springhead sanctuary (Stevens *et al.* 2011). This practice appears to have continued into the 1st and 2nd centuries AD with emmer still recorded in significant amounts at some sites such as West Malling and Leybourne Bypass (Stevens 2009a), Saltwood Tunnel (Stevens 2006a) and Springhead sanctuary (Stevens *et al.* 2011). The evidence is less conclusive for the late Roman period. Spelt wheat dominates and emmer is only represented by a few specimens. There are, however, hints that emmer may have continued to be cultivated in the county. For example a small assemblage from a late Roman quarry pit on the A2/A282 Improvement scheme (Smith 2011a) included a single emmer wheat grain in association with indeterminate wheat rachis fragments. This specimen could however have been re-worked from earlier deposits.

Beyond Kent, emmer is present in both Iron Age and Roman contexts at Selhurst Park Farm, West Sussex (Vitolo 2011), and at Owslebury, Hampshire (Murphy 1977, 50–60) both on the edge of the chalk. Whilst at Hascombe, Surrey, situated on sandstone (greensand), a late Iron Age pit produced a large assemblage of mixed emmer and spelt grain (Murphy 1977, 82–4).

This suggests that the crops which the people chose to grow depended on a combination of the suitability of the local soils and cultural tradition. Thus on the south coast at the edge of the chalk the decision to grow emmer in addition to spelt is likely to reflect the

preference of emmer wheat for acidic soils (van der Veen and Palmer 1997; Carruthers and Allison 2010) whilst in Kent the emmer cultivation in the early Roman period was the continuation of a long tradition.

Three other cereals require consideration: naked (bread) wheat (*Triticum aestivum* s.l.), rye (*Secale cereale* L.) and oats (*Avena sativa* L.). The archaeobotanical evidence for the cultivation of naked or free-threshing wheat during the Roman period in southern England is problematic. Most of the records are of grain alone, with the identification of the naked form based on a typical morphology which is not sufficient for reliable identification to species level (Hillman *et al.* 1996). In addition, there is variation found within the spelt wheat population with a short, fat-grained form of spelt wheat recorded within assemblages from some sites including Downlands, Walmer, Kent (Pelling 2010), Bower Road, Smeeth, Kent (Stevens 2006b) and Silchester (Robinson 2011a). Poorly preserved grains of naked wheat will resemble these short, fat wheat grains and vice versa. It is also known that the diagnostic chaff of the naked wheats tends to be under-represented in the archaeobotanical record as compared to hulled wheats, not only because it is removed at an early stage of crop processing (that is threshing occurs within the fields and/or directly after harvest) but also because the processing of free-threshing cereals does not involve parching, and through this exposure to fire, to free the grain from its chaff as necessary for hulled wheats such as spelt and emmer (Hillman 1981). It is also not possible to distinguish rachis nodes from the basal portion of the wheat ear to species. The naked type wheat rachis illustrated in the Barton Court Farm report (Jones 1984, fig. 158) is clearly one such example and as such cannot be taken as proof of the presence of naked/bread wheat. Furthermore it is recognised that small numbers of naked wheat remains in Roman contexts might well derive from later medieval activity and be intrusive (Pelling *et al.* 2015). The finds of free-threshing wheat and rye in Roman contexts at Staines (Pontibus) are likely examples (report by W. J. Carruthers summarised in McKinley 2004).

Taking these factors into account most authors consider that naked (bread) wheat was not cultivated in southern England during the Roman period (Stevens *et al.* 2011; van der Veen and O'Connor 1998). There is however some evidence that it may have been a minor crop. One sample from an early Roman corn-drying oven at Springhead sanctuary produced considerable numbers of naked wheat grain,

outnumbering the remains of hulled wheat (Stevens 2011a, 97), whilst a late Roman hearth at Northumberland Bottom also contained principally naked wheat grain (Davis 2006b). Similarly, a midden deposit at the Library site, Winchester, Hampshire produced higher percentages of naked wheat grain and rye than the other contexts (Carruthers 2011). This better representation could be due to the presence of kitchen waste as opposed to stable waste or crop-processing debris in this deposit as opposed to the other layers examined, though the possibility of intrusion from later medieval activity needs to be kept in mind. In addition, the examples given above could result from the use of imported grain and therefore do not necessarily imply local cultivation.

The record for rye is even less convincing and suggests that it was only ever present as a weed of other cereal crops. In addition to the finds from Staines and Winchester mentioned above where intrusion may be an issue, rye has been recorded in small amounts from a few sites including Beddington Sewage Farm, Surrey (de Moulins, 1990a) and Saltwood Tunnel (Stevens, 2006a).

Oat grain is regularly recorded within Roman assemblages from the region. However, it is not possible to distinguish wild from cultivated oat grain and floret bases (chaff) are rarely present. Where they have been recovered most have been identified as from wild oats although possible cultivated floret bases were identified from a late pre-Roman context at Suddern Farm, Hampshire (Campbell 2008) and from Daneshill, Hampshire (Green 1991). The general increase in the frequency and percentage presence of oat grain within Roman as compared to Iron Age contexts has led various authors to suggest that this cereal was likely to have been cultivated in southern England during the Roman period (e.g. Booth *et al.* 2007, 281), and that this may reflect the need for high quality animal fodder to support the movement of goods and people (Carruthers and Allison 2010).

Corn-drying ovens

Corn-drying ovens indicate the processing of cereals on a large, almost industrial, scale and are one of the most iconic Roman agricultural buildings (Morris 1979). Most date to the 3rd or 4th century (van der Veen 1989) though there are some 1st- and 2nd-century examples such as the earth-cut oven dating to AD 43–150 found at Hurst Park, East Molesey, Surrey (Hinton 1996). Most examples produce spelt wheat be it as spikelets, fully threshed grain, or indeed sprouted grain (van der Veen 1989). There are exceptions however, such as an

example at Gatehampton Farm, Goring that may not have gone out of use until sometime in the 5th century, and which produced both barley and spelt wheat, 50 per cent of which had germinated (Letts 1995).

In the glume wheats, such as emmer and spelt, the grain is tightly held within its chaff and when the ears are threshed they break up into individual spikelets consisting of two grains, each surrounded by a lemma, palea and glume (Fig. 7.1). In order to free the grain from this enclosing chaff the spikelets are heated to render the chaff brittle so that on pounding it breaks up freeing the grain. The recovery of spelt wheat spikelets from corn-drying ovens shows that they were used for this process whilst charred plant assemblages rich in chaff and arable weed seeds recovered from the stokeholes and flues of these ovens demonstrates the use of the by-products of this and other crop-processing activities as fuel.

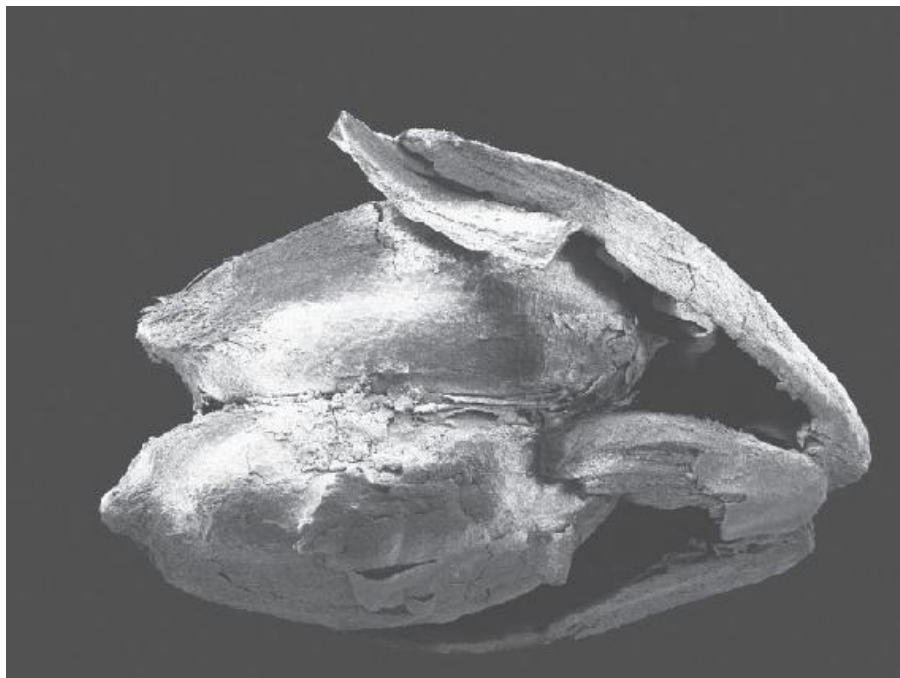


Fig. 7.1: Complete spelt wheat spikelet from a late Roman corn-drying oven (length approximately 4.5mm.) (photograph: author, ©Historic England).

Assemblages of clean or fully threshed spelt grain from corn-drying ovens probably indicate the drying of the grain to harden it before milling into flour. Although it is possible that fully threshed grain was dried prior to being stored, this is less likely as the grain would immediately start to take in moisture after drying and would also be killed or damaged as a result of the drying process and thus be more

susceptible to fungal and insect attack.

Assemblages from corn-drying ovens where only a few of the cereal grains have sprouted are normally interpreted as an attempt to save a crop that had begun to germinate and spoil in storage. However, the recovery of large assemblages of sprouted grain shows that these structures were also used for the production of malt for brewing.

Malting and brewing

In order to make ale from cereal grain it is necessary to deliberately cause the grain to sprout and then, when the sprouts are about two thirds the length of the grain halt the germination process by killing the grain. Sprouting grain results in the starch reserves within the grain being converted to sugars by a group of enzymes collectively known as diastase. These sugars provide food for the growing plant. It is this combination of sugars, diastase and starch that is needed in order for yeasts to convert the sugars in the grain to alcohol and thus produce beer.

Grain is malted by first soaking it in water overnight, draining off the liquid and then spreading the grain out on a floor or keeping it in an open vessel. The grain is then turned or mixed regularly and kept moist until the grain germinates and the sprouts are well formed. At this point two methods can be used in order to halt germination and produce a product that can be stored and kept for brewing as needed. The first method, believed to have originated in Egypt, results in malt cakes. The sprouted grain and chaff is crushed and pounded to make a sticky paste which is moulded into small patties which are dried and gently baked on the side of the fire. Once baked these malt cakes can be stored until needed. The second method, thought to have originated in Babylonia, results in ground malt. The whole grain, still in its chaff, is heated either by roasting it in a pot or drying it within ovens. The sprouts and chaff, known as ‘the comings’ are then removed by rubbing, following which the clean grain is ground into a meal or a coarse flour which can be kept for up to a year and used in brewing as needed (Corran 1975, 11–22).

The archaeobotanical assemblages of sprouted grain and ‘comings’ recovered from Roman corn-drying ovens and features associated with them such as those excavated at Northfleet villa, Kent (Smith 2011b) is clear evidence for the use of the Babylonian method in Roman Britain. Furthermore, the considerable evidence from early and middle Roman Springhead, though not in this case associated with corn-drying ovens, shows that this method was practiced from the very

beginning of the Roman occupation (Stevens 2011a). The lack of this type of evidence from Iron Age sites across the whole of Britain, including the earlier occupation at Springhead, suggests that the adoption of the Babylonian method of malting may well have been a Roman introduction, although it could also be argued that the pattern results from a step-change in the scale of production. This does not mean, as Stevens *et al.* (2011, 242) note, that no beer was drunk in Britain before this date. Rather, I would argue that it was the method of ale production that changed. Unlike the Babylonian method, the making of malt cakes using the Egyptian method of brewing would leave little archaeobotanical trace. If the malt cakes were accidentally burnt during baking they would be very fragile, and unlikely to be preserved. Furthermore the remains would be difficult to identify when found. Rare examples of possible malt cakes such as the Yarnton barley ‘bread’ (Robinson 2011b, 189; Hey and Robinson 2011; Campbell *et al.* 2013) would be expected, but only in exceptional circumstances.

Pulses

Pea (*Pisum sativum* L.), Celtic or broad bean (*Vicia faba* L.), and lentil (*Lens culinaris* Medik.) were all clearly utilised in south-east England in Roman times though the archaeobotanical evidence for each species is somewhat different. Pea is recorded in considerable numbers in assemblages from Iron Age Kent such as Church Whitfield (Campbell 2014) and Queen Elizabeth Square, Maidstone (Pelling 2004), the latter representing an accidentally burnt pea crop. Celtic bean is also present with one exceptional late Bronze/early Iron Age assemblage recovered from a pit at Saltwood Tunnel (Stevens 2006a; Giorgi and Stafford 2006). This suggests that the cultivation of pulses alongside cereals was a tradition of considerable duration in Kent (*cf.* Carruthers and Allison 2010). Both legumes continue to be a regular component in Roman assemblages from the county. Pea and Celtic bean were recorded from both the sanctuary and roadside settlement at Springhead (Stevens *et al.* 2011), from a number of other Channel Rail Link sites (Giorgi and Stafford 2006), and from Shelford Farm Estate (Carruthers and Allison 2010).

Pea and Celtic bean were also recovered from Roman deposits at Staines, Surrey (Carruthers in McKinley 2004) and in both Iron Age and Roman contexts at Selhurst Park Farm, West Sussex (Vitolo 2011). Celtic bean was also recorded in Iron Age and Roman deposits from excavations undertaken as part of the construction of the A27

Westhampnett bypass, West Sussex (Hinton 2008), and at Eden Park, Toddington Nurseries, West Sussex, a site thought to be associated with Angmering Roman villa (Pelling 2012), whilst pea was present at a Roman site in Middleton-on-Sea, West Sussex (Hinton 2005).

Unlike Celtic bean and pea, lentils are likely to have been imported into Britain, though lentil can be found growing today on tips and waste ground (Stace 1997, 413). Whilst most records are from Roman London, lentil was identified from both the sanctuary and roadside settlement at Springhead and in a 1st-century cremation burial within the Roman cemetery at Pepper Hill, Kent (Stevens *et al.* 2011; Giorgi and Stafford 2006). Lentil and other pulses appear to have been used regularly as food offerings in the cremation rite, with high numbers of lentil in particular found in cremation-related deposits at the eastern cemetery of Roman London (Davis 2000). The Greeks considered pulses to be the food of the dead, so it seems possible that pulses were being burnt as food for the journey to the underworld. Whilst both pea and Celtic bean may have been grown as animal fodder as well as for human consumption, evidence that all three pulses formed part of the human diet is provided by mineral-replaced remains of these three species identified from a large, late 1st- to 2nd-century AD latrine pit within insula IX at Silchester (Robinson 2011a).

Oil and fibre crops

Finds of flax (*Linum usitatissimum* L.), grown for its fibre or oil or both, are relatively frequent. Capsule fragments and seeds have been recovered not only from waterlogged contexts such as the late Roman well at Thurnham villa (Giorgi and Stafford 2006) but also as charred macrofossils, from Northumberland Bottom (Giorgi and Stafford 2006), Northfleet villa, Springhead sanctuary and roadside settlement (Stevens *et al.* 2011), Shelford Farm Estate (Carruthers and Allison 2010), Eden Park (Pelling 2012), and Kingsborough Farm and Manor, Isle of Thanet, where over 650 capsule fragments were found within a late Iron Age/early Roman ditch fill (Stevens 2009b).

Two other species, which can be weeds of flax but are sometimes cultivated in their own right for oil, also occur. Gold-of-pleasure (*Camelina sativa* (L.) Crantz.) has been recorded at two London (Southwark) sites: St Thomas St. (Willcox 1977) and 199 Borough High Street (Tyers 1988, 463), and in a late Iron Age context at Eythorne Street, Kent (Davis 2006a). *Camelina alyssum* (Mill.) Thell. was identified from a late Roman well fill at Barton Court Farm in association with remains of flax (Robinson 1984, 33).

Another possible oil crop is some form of brassica species and in particular black mustard (*Brassica nigra* (L.) W. D. J. Koch), though these could equally have been grown as a flavouring, or as a vegetable. That brassicas were cultivated, or at the very least collected in the Iron Age (*contra* van der Veen *et al.* 2008; van der Veen 2008), is attested by a number of finds from Hampshire (Campbell 2000) and in particular a pure assemblage of seeds found charred as a residue within a pot base found in an Iron Age pit at Old Down Farm (Murphy 1977, plate 14 and 74–5; Green 1981). Brassicas were well-established oil crops in the classical world (Zohary and Hopf 2000, 139) and while they do not appear to be recovered as frequently from Roman sites in the region as compared to the preceding Iron Age (*cf.* Giorgi and Stafford 2006), waterlogged black mustard seeds and fruit attachments were identified from a late Roman pit fill, and mineral-replaced *Brassica/Sinapis* sp. seeds within middle to late Roman features at Staines (Carruthers in McKinley 2004). Mineral-replaced *Brassica/Sinapis* sp. seeds have also been recorded at Silchester, with black mustard preserved through waterlogging identified from a 3rd- to 4th-century AD well fill (Robinson 2011b; Robinson *et al.* 2006). A few charred *Brassica/Sinapis* sp. seeds were also noted in an early Roman ditch fill at Westhawk Farm, Kent (Pelling 2008a) and from Queen Elizabeth Square, Maidstone (Pelling 2004), whilst a single charred *Brassica* sp. seed was identified from a 2nd- to 3rd-century AD pit at Bower Road, Smeeth, Kent (Stevens 2006b). One possible explanation for the apparent decrease in the occurrence of these seeds at Roman sites in Kent in particular might be the availability of other oils and flavourings such as linseed and imported olive oil, coriander, dill and fennel (Lodwick 2014; van der Veen *et al.* 2008; see below for further discussion). However it must be remembered that in many of the assemblages in which brassica seeds have been recorded they are likely to have been present as weeds of other crops, much like oilseed rape is seen growing today on waste ground and field margins.

Opium poppy (*Papaver somniferum* L.) may also have been a source of oil, although as with black mustard its use for flavouring or for medicinal purposes is just as likely. Again it is present in Hampshire from the early Iron Age (Campbell 2000; 2008, *contra* van der Veen *et al.* 2008; van der Veen 2008). As with brassica seeds, its presence in many assemblages is probably because it was growing as an arable weed or in waste ground around settlements. This may explain the distribution of this species as observed by van der Veen *et al.* (2008, figure 10b), that is within the main cereal-producing areas, as well as

its increase in ubiquity over the course of the Roman period (van der Veen 2008, figure 10).

In addition to a record from a late Iron Age pit on the A2/A282 improvement scheme site (Smith 2011a), possible charred opium poppy seeds were recovered from a 2nd- to 3rd-century AD context at Bower Road, Smeeth (Stevens 2006b) and from a late Roman feature at Burgess Hill, West Sussex (Hinton, 1999). A single charred specimen was also identified from the fill of a bedding trench at Fishbourne palace, West Sussex (Carruthers 1991) and preserved by waterlogging in a late Roman well fill at Thurnham villa, Kent (Giorgi 2006b).

Hemp (*Cannabis sativa* L.) can be grown for fibre, for oil or for medicinal use. A seed was identified from a 3rd–4th-century deposit at New Fresh Wharf (Willcox 1977, table 1). However, the deposit suffered later Saxon disturbance so this record cannot be regarded as reliable (Willcox 1977, 280). More certain is a tentatively mineral-replaced seed fragment from an early Roman context discovered during excavations along the East Kent Access Road, Thanet (Kath Hunter *pers. comm.*). The only possible pollen record from the region comes from Swanbourne Lake, Arundel (Scaife 2000) but it is likely to be medieval. This contrasts with a number of records of hemp from Roman York (Tomlinson and Hall 1996) possibly indicating regional differences in uptake.

Fodder

In addition to the cultivation of oats for fodder and the likely use of barley, pulses and the by-products of cereal processing as feed for all types of livestock from chickens to cattle, the Roman period provides the first good evidence for the establishment of hay meadows. In traditional hay meadows animals are shut out of the meadow in early to late spring until the hay is mown in July. Following the hay harvest the meadow can then be grazed until the following spring (Rodwell 1992, 57). This management regime favours plants that flower and set seed by the time the hay is cut and results in a distinctive flora which can be distinguished archaeobotanically from other types of grassland (Fig. 7.2).

Typical hay meadow plant recorded in archaeobotanical assemblages include certain buttercups (*Ranunculus* species), hay rattle (*Rhinanthus minor* L.), ox-eye daisy (*Leucanthemum vulgare* Lam.), and lesser knapweed (*Centaurea nigra* L.). Their remains have been recovered from waterlogged features dating from at least the early

2nd century in the Upper Thames valley (Booth *et al.* 2007, 22) and from early Roman features in Silchester (Robinson 2011a). Hay was also one of the components in material recovered from a middle Roman waterhole at Thorpe Lea Nurseries, near Chertsey, Surrey (Robinson 2012).



Fig. 7.2: Hay meadow in flower, Cherwell meadows, Oxford (photograph: author, ©Historic England).

Plants characteristic of hay have also been recovered from London, for example in early to late Roman contexts at 15–35 Copthall Avenue, London (de Moulins 1990b), and in a midden deposit at Leadenhall Court, London (Davis 1993). At both sites animal dung and/or stable waste are likely to be represented, serving to emphasise the importance of fodder in the urban and rural interactions. The investment in infrastructure that the establishment of hay meadows represents purely in terms of ‘the miles of ditches that were dug’ (Lambrick and Robinson 1988, 73) is just one example of how the landscape was transformed to produce a product for a new market.

Horticulture

The development of horticulture from the growth of useful plants for local use to the cultivation of herbs, fruit and vegetables for market is one of the major changes that occurred as a result of the Roman conquest (van der Veen *et al.* 2008). We also have the first evidence for gardens designed purely for pleasure and entertainment. These

developments were accompanied by the introduction of new plants some of which escaped from cultivation to become part of the British flora (Preston *et al.* 2004) and others which may only have been cultivated on a small scale or on an experimental basis if at all.

Tree and vine fruit

While there is evidence for vineyards in central England, including at Wollaston, Northamptonshire where *Vitis* pollen was recovered from a drainage ditch adjacent to cultivation trenches (Brown *et al.* 2001; van der Veen 2008), the number of occurrences of grape (*Vitis vinifera* L.) pips decreases over time (van der Veen *et al.* 2008, fig. 5a). Although these remains could be derived from locally-grown fruit or from imported raisins, it might indicate that viticulture was not a viable economic option. Finds from the south-eastern counties outside London are relatively few. They include mineral-replaced pips from an early and middle Roman pit fill at the Springhead sanctuary site (Stevens 2011a) and burnt seeds and grapes within a 1st-century cremation burial at Pepper Hill, nearby (Davis 2006c). This could imply that the consumption of grapes was rare and associated with special occasions and Roman life-ways. However, it may also be a consequence of the relatively few studies of waterlogged features in these counties.

By contrast, finds of plums, cherries, damsons, etc. (*Prunus* species) and apple/pear (*Malus/Pyrus* sp.) increase over the period of Roman rule. They are also well represented at rural sites across the country indicating that pomiculture was adopted and flourished, and by implication that techniques such as grafting were introduced (van der Veen *et al.* 2008).

The seeds of apple and pear are difficult to distinguish from one another unless they are well preserved and cannot be identified to species level. Whilst crab apple (*Malus sylvestris* (L.) Mill.) is native to Britain with evidence of use from the early Neolithic (Robinson *et al.* 2006, Moffett *et al.* 1989), the cultivated apple (*Malus domestica* Borkh.) is not related to crab apple but rather to a wild apple native to central Asia (Harris *et al.* 2002). This has led to speculation that domesticated apple was introduced into Britain during the Roman period with finds such as the plentiful mineral-replaced remains recovered from late 3rd- to 4th-century latrine pits within insula IX at Silchester likely to represent locally-grown cultivated apples (Robinson *et al.* 2006, van der Veen *et al.* 2008).

The situation with regard to plums and cherries, other than our

native sloe (*Prunus spinosa* L.), is more straightforward in that these really only appear from the Roman period onwards (Tomlinson and Hall 1996; Preston *et al.* 2004). There are, however, difficulties in separating the different sub-species of plum *Prunus domestica* L., especially when based on fruit-stone morphology alone, because so much hybridisation has occurred over the centuries (Stace 1997, 365).

Mineral-replaced plum-type stones were fairly frequent within early and middle Roman deposits at the Springhead sanctuary (Stevens 2011a), whilst mineral-replaced kernel and skin of *Prunus* sp. were recovered from a 2nd-century context at Staines (Carruthers in McKinley 2004). Charred remains of plum were also recovered from 2nd-century contexts at Staines (Carruthers in McKinley 2004), whilst undifferentiated *Prunus* sp. stones were recorded from a pit at Lullingstone villa, Kent (Metcalf and Doherty 1987), from a late Roman well fill at Thurnham villa, Kent (Giorgi 2006b), from Middleton-on-Sea (Hinton 2005) and from Queen Elizabeth Square, Maidstone (Pelling 2004).

Cherry (*Prunus avium/cerasus*) has been identified from a 2nd-century waterhole at Westhawk Farm (Pelling 2008a), from a pit at Lullingstone villa (Metcalf and Doherty 1987)) and from a 2nd-century well at Northfleet villa (Stevens 2011b), whilst three mineral-replaced examples were recovered from an early Roman pit at the roadside settlement at Springhead (Stevens 2011a) and two charred specimens from early Roman pit fills at Northumberland Bottom (Davis 2006b).

Herbs and vegetables

The three most commonly occurring herbs recorded by van der Veen *et al.* in their 2008 review, excluding mint of which there are native species, were coriander (*Coriandrum sativum* L.), dill (*Anethum graveolens* L.) and celery (*Apium graveolens* L.). All three have now been recovered from wells within the late Iron Age oppidum at Silchester showing that these flavourings were adopted by some members of Iron Age Society well before the conquest (Lodwick 2014). The seeds of these species were commonly used in Roman cooking (e.g. Vehling 1977) and could easily have been added to existing dishes to provide a novel new flavour (van der Veen *et al.* 2008; Lodwick 2014). They could have been imported dried or grown from seed relatively easily.

Charred remains of coriander were recovered from early Roman features at Springhead sanctuary (Stevens 2011a) whilst a middle

Roman waterhole at Thorpe Lea Nurseries produced a single waterlogged seed (Robinson 2012). Dill was identified from a 2nd-century waterhole at Westhawk Farm (Pelling 2008a) whilst *Apium* sp. seeds were found occasionally within contexts at both Springhead sites, though no distinction was made between the edible species (*A. graveolens*) and other species within this genus such as fools celery (*A. nodiflorum* (L.) Lag.) (Stevens 2011a).

Fennel (*Foeniculum vulgare* Mill.), another introduced Roman herb which has become naturalised (Preston *et al.* 2004; Fig. 7.3), was recovered from a 3rd- to 4th-century channel at Staines (Carruthers in McKinley 2004). There are also tentative identifications from early Roman deposits at Springhead sanctuary (Stevens 2011a). Finds of this species are relatively rare and appear to decline after their first appearance (van der Veen 2008). However, this might be due to preservation bias or even a local preference for use of their leaves rather than the more readily preserved seeds.



Fig. 7.3: Fennel, a Roman escape from cultivation, growing on the south

coast (photograph: author, ©Historic England).

In terms of vegetables there are few records within our area of focus other than finds of seeds of carrot (*Daucus carota* L.) and parsnip (*Pastinaca sativa* L.) which are more likely to represent wild species growing as weeds in the assemblages in which they occur rather than plants grown for food. A similar weed source is also suggested for a find of beet (*Beta vulgaris* L.) from the Springhead roadside settlement (Stevens *et al.* 2011). More intriguing is a possible onion (*Allium cepa* L.) seed recovered from an early Roman pit fill at Springhead sanctuary. This is the first record of this species from Britain despite frequent use of onions in Roman cooking (Stevens 2011a; Stevens *et al.* 2011; Vehling 1977).

Imported species

Fig was the most frequently recorded new food in the review by van der Veen *et al.* (2008). This may be in part because the seeds are robust and preserve well even when differential preservation is evident. Whilst there is some debate over whether figs could have been grown in Roman Britain (Dickson and Dickson 1996) most authors consider that the archaeobotanical record derives from the use of dried imported fruits.

In Kent, fig remains include a possible fruit from the same 1st-century cremation burial at Pepper Hill that contained grapes, lentils and beans (see above, Davis 2006c). Fragments of fruit were also recovered from an early Roman kiln fill at the Springhead roadside settlement, whilst two middle Roman pits at Springhead sanctuary produced mineral-replaced seeds (Stevens 2011a). Five mineral-replaced seeds were also identified from a 2nd- to 3rd-century pit at Staines (Carruthers in McKinley 2004).

Although probably more properly regarded as an integral part of Roman ritual practice rather than principally as a food source (Lodwick 2015; Kislev 1988), records of stone pine (*Pinus pinea* L.) are becoming increasingly frequent. This may in part result from better sampling of cremation deposits, temple and other religious sites in more recent excavations. Charred remains of stone pine cone scales were recorded from a pond/spring fill at Springhead sanctuary and from a nearby quarry fill (Stevens 2011a) while charred nut shell fragments were identified from a hearth within the Roman town (Campbell 1998). Charred nut shell fragments were also identified from a 1st- to 2nd-century pit associated with a shrine at Westhawk

Farm (Pelling 2008a, 354), from Monkton Mount Pleasant, Isle of Thanet (Pelling 2008b) and from a ditch fill associated with a late Roman bath-house at Shelford Farm Estate (Carruthers and Allison 2010). Stone pine cone scales were also recovered from a 2nd- to 3rd-century well at Lullingstone Roman villa (Doherty 1987), whilst beyond Kent, charred scales and nuts were found in a 1st-century burnt layer within one of the rooms in the west wing of Fishbourne palace, West Sussex (Reynolds 1996).

Although the warm chalk soils and relatively dry climate of Kent would be somewhat conducive to local cultivation (Campbell 1998; Fig. 7.4), it is clear that the cones were traded around the empire. This is evidenced by the pine cones still with their stalks attached recovered from a wreck near Toulon (Tchernia *et al.* 1978; Lodwick 2015).

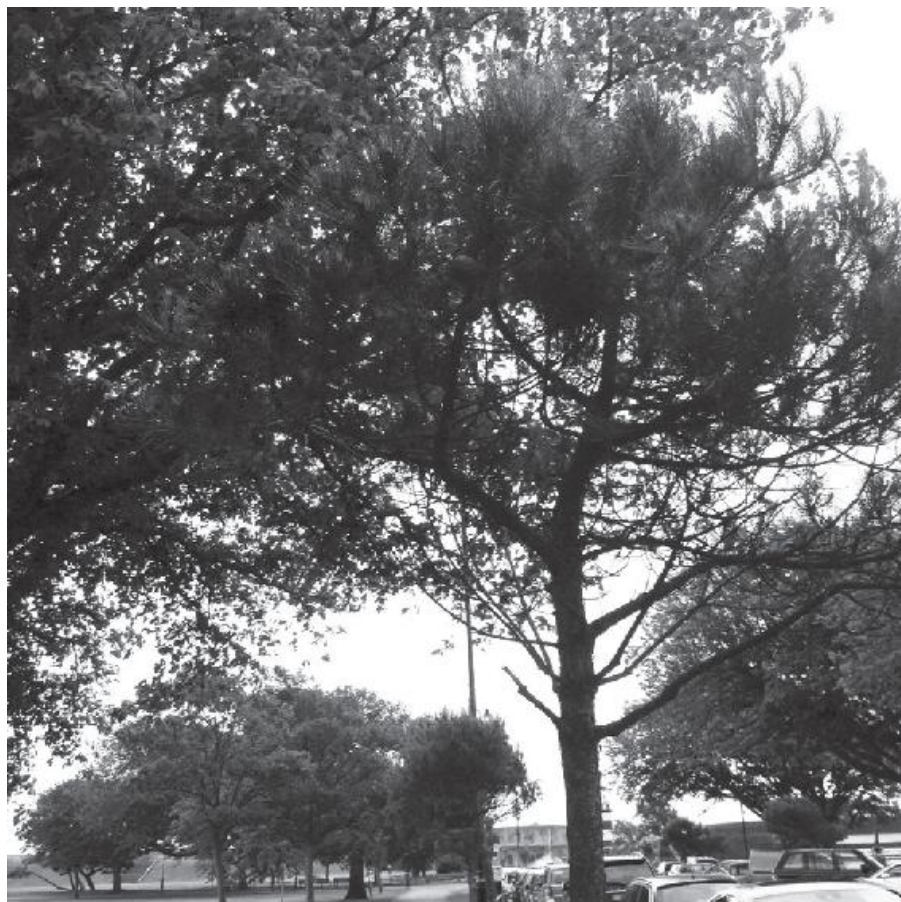


Fig. 7.4: Young Stone Pines bearing nut-producing cones on Southsea seafront, suggesting that cultivation in the Roman period would have been viable (photograph: author, ©Historic England).

Concluding remarks

The archaeobotanical dataset from the far south-east of England is not as large as that from the Upper Thames Valley and Hampshire (van der Veen *et al.* 2007; van der Veen 2008). However it is sufficient to show a distinctive regional farming character with a greater emphasis on the cultivation of emmer as compared to the Hampshire Downs and with more evidence from the growing of pulses, particularly peas, in the late Iron Age and into the early Roman period. By the 3rd century spelt wheat cultivation appears to have increased at the expense of emmer in Kent though more evidence is required to confirm this and it may not have occurred across the board.

It is also clear that at least a proportion of the population living in the area were quick to adopt new tastes, consuming new foods such as grape, fig, and coriander (van der Veen *et al.* 2007; van der Veen 2008). They also adopted new methods of ale production responding to new markets and consumers. The importance of fodder for the movement of goods and people led to new methods of grassland management and probably to an increase in the cultivation of oat. The number of records for *Prunus* species, particularly of middle Roman date, suggests that orchards were also established and by implication that the investment was merited because of a ready market and argues against a period of stagnation in the 2nd century (Jones 1981). Rather the evidence seems to suggest continual development and the increasing industrialisation of agriculture; a landscape of opportunity.

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Chapter 8

Querns and Millstones in Late Iron Age and Roman London and South-East England

Chris Green

(Note: illustrated querns and millstones are referred to by number as ‘3’ to ‘37’ in the text, omitting the Fig. reference to facilitate reading. See also [appendix](#)).

Introduction

This is the first survey of early rotary querns (hand-mills) and millstones in south-eastern England: strangely so as the South-East is one of the most intensively studied areas of geology in the world, additionally supplied with long-established and prosperous archaeological societies. It is presumably because of their essential but inconvenient characteristic of great mass that antiquaries and excavators have ignored and discarded these objects by the cartload, while museum curators as often as not lost the provenance of those that remained. So this essay is correct only to a point, for a comprehensive search of the material is impossible. Truly these have been strangely neglected objects; who would think that they stood so vitally between the grain harvest and daily bread?

No survey of south-eastern querns and millstones can pass by the work of E. Cecil Curwen, Sussex doctor and fine archaeologist, who was acutely aware of this neglect and drew attention to it in classic articles (1937; 1941; well summarised in Peacock 2013, 58–61). From his work came an overdue awareness of the importance of quernstones in the archaeology of everyday life, but sadly Curwen had misunderstood an essential aspect of their production. No geologist himself, he missed the evidence of rock types and assumed that manufacture had been an essentially local, and possibly even domestic task utilising stones which came to hand and working to a traditional regional ‘pattern’, say his ‘Wessex’ or ‘Sussex’ styles. His mistake persisted for decades. But today a very different picture has emerged, in which considerably more sophisticated ancients used specialist tools (steel, not iron) and techniques to cut carefully chosen rocks. The quarries they used may even have been tribal property in the Iron

Age, thus controlling the use of the best milling rocks (Cutler forthcoming). The finer nuances of form often prove to reflect not a broad culture, but a specific industry.

This paper, then, will be organised around rock source, not quern-making culture. It includes Iron Age rotary querns, for they are the origin of most Romano-British industries. It includes ‘imports’ from continental Europe (a place less remote than the quern quarries of northern England). And it looks a little outside the south-eastern counties of Kent, Surrey and Sussex, in order to engage with the mass importation of lava querns and millstones through London (the major town and port of Britannia) and perhaps Colchester (its early capital).

Three broad-brush (but helpful) categories are used in this review:

Iron Age rotaries. Rotary querns developed in the middle Iron Age in England as a direct result of the spread of iron and steel tools which alone could cut the complex shape of the stones. They appear in Sussex and Hampshire c. 350 BC, but elsewhere often not until after 100 BC; the date of introduction is a fertile field for investigation (Wefers 2011; Peacock and Cutler 2011). Though usually spoken of alongside Roman querns, volumetric study (Green forthcoming) suggests that the first Iron Age examples were generally far heavier machines (typically with a 40+kg top stone when new) intended for two person use and indeed often supplied with two handle sockets. They surely suited communal rather than household-based social organisation. They were long-lived objects often transported surprisingly far from important quarries. Dating: broadly 350–1 BC, mainly 100–1 BC.

Roman querns. Smaller hand-mills of say 300–425mm diameter with a top stone around 20kg (when new). They may have the same taller form of the Iron Age rotaries, or be discoid. Clearly they were suitable for household use, and could be worked by one person. They introduced new rock sources, notably the puddingstones and lava, to supplement the traditional regional staples. They are especially abundant in the period AD 1–150.

Millstones. Millstones – grinding stones over 500mm in diameter, with top stones exceeding 50kg when new – indicate a mechanical mill powered by water or (more commonly in Roman times) donkeys, mules, and perhaps men. They were geared or used a capstan arrangement. Millstones indicate investment in stone, mill, and power source; they clearly suit the landowner, whether of the villa estate or (later) the medieval manor. Millstones normally indicate a date after

AD 100 in Roman Britain.

The chronology of querns and millstones is far from easy since archaeological carelessness is compounded by the facts that these objects had a long working life, often followed by all sorts of reuse: as building stone, post-packing, sharpening stones (secondary hones), and so on.

Iron Age and Roman stones are frequently dishd, that is have depressed conical rather than flat grinding surfaces, a trait distinguishing them from later stones. A special form, the well-known ‘Pompeian’ mill is large and has a biconical (‘hourglass’) section, but is rare in Britain (Peacock 2013, chapter 5; Williams and Peacock 2011c). Stones with little or no dish were increasingly used (naturally as diameters increased) as the Romano-British period wore on.

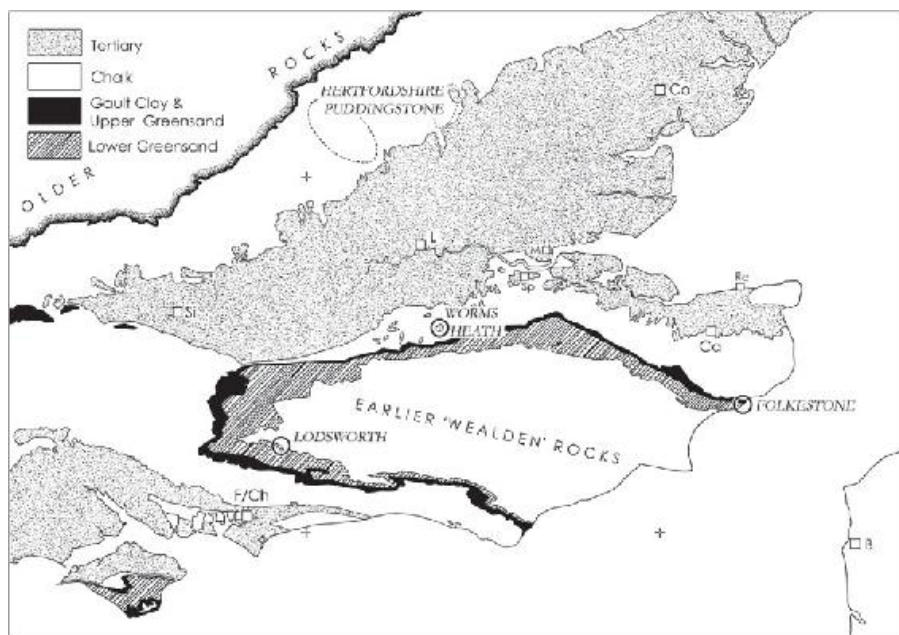


Fig. 8.1: Simplified solid geology of South-East England, with the location of quern and millstone industries, and places mentioned in the text. Grid 100km (information: Geological Survey of Great Britain 1964).

Rock sources in the South-East

Fig. 8.1 shows a simplified and probably familiar map of the ‘solid’ regional geology (i.e. omitting Pleistocene/Holocene deposits like Plateau Drift on the Chalk downs and alluvium on valley floors). Even discounting such ‘drift’, this is generally an area of young and soft sediments. The Tertiaries are mainly unconsolidated sands and clays, and most Chalk is far too soft for quern-making. In the South-East,

Gault Clay largely takes the place of Upper Greensand (which provides hard rocks from the Isle of Wight westward) and so the group provides no rock for quern manufacture here. The earliest rocks of the South-East are non-marine in origin - the Purbeck Group of the uppermost Jurassic and the Hastings Beds and Weald Clay formations of the early Cretaceous; most are soft sediments only locally developing thin strata of harder rock: 'minor' sandstones and limestones or 'partings' in geological parlance.



Fig. 8.2: Distant and overseas sources of supply mentioned in the text. F: Fécamp; V: Vauxrezis; ORS: Old Red Sandstone.

By process of elimination we can therefore identify the 'Lower Greensand' zone as the most promising for querns and millstones. The group includes (from oldest to youngest) the Atherfield, Hythe, Sandgate, and Folkestone Formations; all are shallow marine deposits and indeed the mineral which gives greensand its name, glauconite, is exclusively marine in origin. In the past, geologists, when shown a quern, could again and again determine a Lower Greensand source, but since the Weald is ringed by 220km of this group, archaeologists hoped for more precision. Two assumptions were therefore made: the rock source would be fairly local to the point of discovery (Curwen's assumption, as we have seen), and that it would also probably have been used as a building stone. Since Ragstone, a sandy limestone from

the Hythe Beds, is the largest and best-known source of building stone in the region (see Worssam and Tatton-Brown 1993), it is frequently quoted as a probable quern/millstone source, despite its notoriously difficult working properties. These assumptions can be seen, to name an honourable example, in Tomalin's (1977) interim conclusions on the quernstones of Weybridge in north-east Surrey.

In fact, Ragstone was rarely used for querns: the only certain example known to the writer is the Iron Age rotary from Harrold, Bedfordshire (3), and since Harrold is 115km from the nearest Ragstone strata, Curwen's assumption of local supply is not well supported. It can now be stated with some confidence that the majority of the greensand querns and millstones in the south and east of England – even defined as broadly as the entire area of [Fig. 8.1](#) – are from two geologically localised and distinctive sources at either end of the Wealden 'Greensand Ridge': Folkestone in east Kent, and Lodsworth in West Sussex.

Folkestone greensand

It is odd, bordering on the reprehensible, that the importance of Folkestone greensand was not recognised long ago; countless geologists have after all walked over the material at Copt Point while studying the classic Gault Clay section above. The stone occurs as large discontinuous lenses or rafts which have calcified within the Folkestone Sands (Lower Cretaceous, Albian stage) underlying the Gault Clay in a very restricted area probably reaching not far beyond the modern conurbation of Folkestone and Cheriton. The intervening unconsolidated sand is quite soft, and at Copt Point (NGR: TR 2436) great numbers of boulders litter the beach where they have been washed out, forming much the largest natural exposure of hard rock between North Yorkshire and the Isle of Wight. The stone 'rafts' have distinctive hummocky surfaces, often retained on the unworked underside of the lower stones of querns and millstones (9). And above all the stone is distinctive in the hand specimen: a compact coarse calcareous sandstone, grey-hearted but weathering greenish-yellow-cream, with many large grains of polished quartz sand and glauconite (dark green to black) in the range 1–2mm; larger clasts are often present. Fossil molluscs, echinoids, and worm tubes commonly occur, and whitish chert develops in places, though it often caused a stone to be rejected. The cement is calcite, so there is a strong reaction with acids, unusual in querns and millstones. The stone is very tough, and

available without digging. The caveat when identifying a Folkestone quern is that acid ground conditions may dissolve the surface leaving raised clasts and an uncharacteristic appearance.

S. E. Winbolt realised, when excavating the East Wear Bay Roman villa just east of Folkestone in the 1920s, that the querns he was recovering were of the local rock (Winbolt 1925, 25, 108–9). But it was not until the 1970s that local archaeologists began to collect the many rough-outs and part-finished products that littered the foreshore – well over two hundred are recorded, and Peter Keller collated these efforts and produced an interim publication in 1989. By 2010–11 Winbolt's villa was at threat from landslip, and rescue excavations by Canterbury Archaeological Trust (Parfitt 2012) uncovered a further mass of very well preserved production waste. It appears that this deposit, and the material slipping down the cliff and on to the foreshore, derives from a massive waste tip, or tips, of late Iron Age and earliest Romano-British date, perhaps broadly 50 BC to AD 50. Study of this and associated material continues.

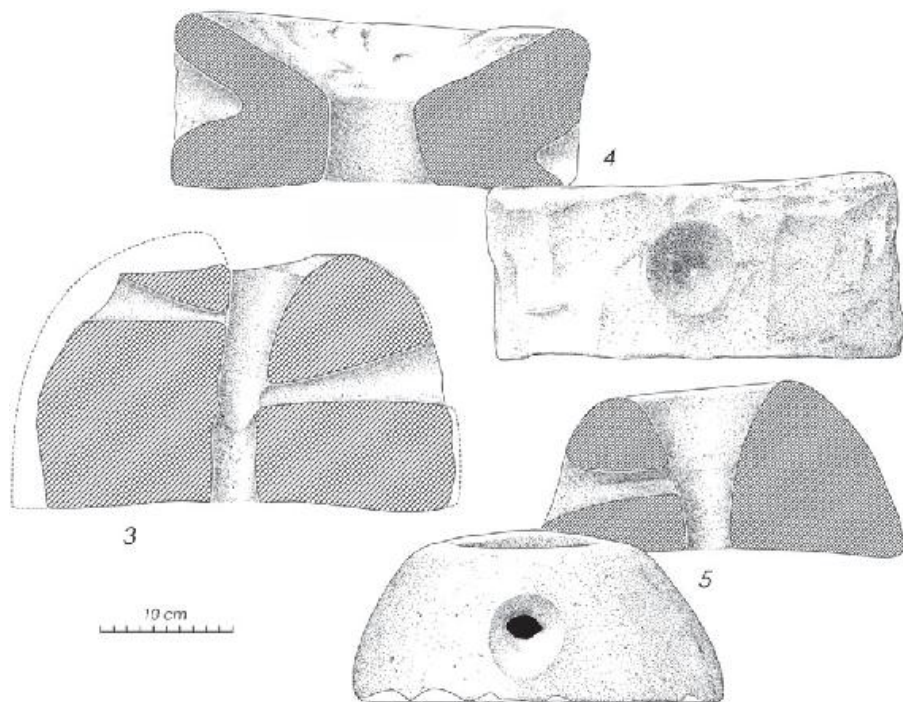


Fig. 8.3: Late Iron Age querns of Ragstone (3) and Folkestone greensand (4–5). (Scale 1:5).

Although Folkestone greensand rock is now best seen at Copt Point, the coast to the east and west of Folkestone was radically, and generally unhappily altered by the construction of the Harbour from

1807, and its present appearance misleads. Before 1807, the long West Cliff (NGR TR 2135/2235) released practically limitless supplies of rock in a series of landslips, and this would have been the main quarry in antiquity. The Harbour then obstructed long-shore drift and built up a large shingle beach under the West Cliff, which was quickly stabilised and indeed became a relict cliff (and pleasure garden) from mid-Victorian times. Conversely the coast at East Cliff and Copt Point were not subject to landslip and so were a less likely source of quern-making rock in antiquity, but the new Harbour starved them of shingle and Copt Point suffered catastrophic erosion in mid-Victorian times, developing the half-submerged reef of Folkestone rock we see today. (The production waste above the Roman villa is actually to the east of all the rock deposits, which would have been taken from the base of cliffs and landslips a kilometre or two distant).

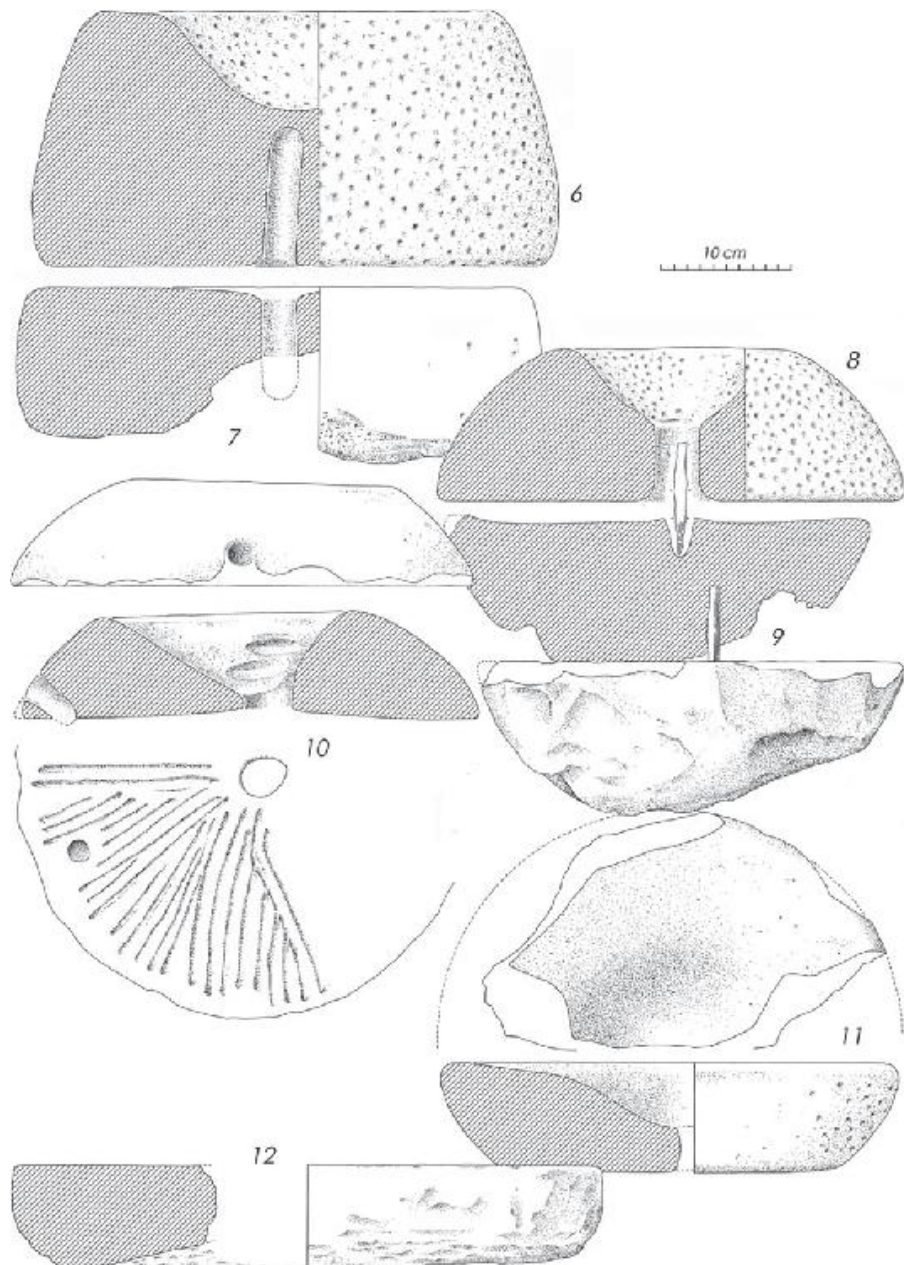


Fig. 8.4: Rotary querns (6–10 and 12) and a mortar (11) in Folkestone greensand. (Scale 1:5).

Folkestone rock was used for saddle querns from the Neolithic (Greenfield 1960), though Bronze Age/Iron Age examples are far commoner. Late Iron Age rotaries, many with upper stones of 50 + kg dominate the production dump at East Wear Bay and are widely distributed, but their typological development is hard to demonstrate (6, 7). Smaller rounded querns with a conical ‘hopper’ characterise the

early Romano-British period, perhaps before AD 100, and are ubiquitous on East Kent sites (8, 9, 10). Mortars, too, are not uncommon in this stone and probably belong to the same period (11). The site of later Roman production is not known and may have been lost to coastal erosion. Poorly-dated discoid querns/small mills appear to be common (12, 13), but the most spectacular products are late Roman millstones, known from Ickham outside Canterbury (14) and Thanet Earth near Margate; one from the latter site is four feet (1.2m) in diameter (15, 16).

The distribution of Folkestone querns and millstones is as poorly known as their date. Caroline Ingle (1993) realised that Folkestone late Iron Age rotaries were present in quantity at Hunsbury hill-fort outside Northampton, and they may have supplied the east of England and the Midlands as much as the South-East, where there was the competition of the Lodsworth source. A group has just been recognised from near Bishops Stortford on the Hertfordshire/Essex border (4, 5), with other examples from Aldermaston, Berks, and Odell, Beds; the list will grow. Keller's early impression, of widespread distribution in the late Iron Age, followed by a much more local east Kent distribution in Roman times appears to hold good: rather the reverse of the better-known distribution of Lodsworth products (see below). The large late Roman millstones may prove an exception, though, since fragments have been found at the Roman small town of Ware in east Hertfordshire, where they were almost certainly used in watermills.

One remarkable surprise is the absence or near absence of Folkestone rock in Roman Gaul; Peacock and this author failed to discover it among the substantial collections of the Musée du Boulogne in 2012, while Picavet (pers. comm., 2013) has found only one probable example in northern France, despite the obvious shortage there of suitable rock for Gallo-Roman counterparts. An export embargo seems to be indicated, but we cannot guess its purpose, and there is the contradictory evidence of the trade in *meules en poudingue* to Britain (see below, 'French Puddingstone').

Folkestone querns and millstones continued to be produced in the mid-Saxon to medieval periods.

Lodsworth greensand

Lodsworth's products did not identify themselves so obviously as Folkestone's, and but for their very distinctive lithology they would

not have been recognised as from a single source, and run to earth. Peacock (1987) describes his continual encounters with the stone on Iron Age and Roman sites across the south of England, and he eventually located the source of at least the late Iron Age rotaries on an undistinguished wooded hillside at Lodsworth, north-east of Midhurst in West Sussex (NGR: SU 9223). Débitage, including rough-outs and part-finished querns, was present, but quern chronology could not be demonstrated from the quarry, so evidence was sought from domestic sites across south and south-central England (this is usually the case). The distribution is now very well established, having been brought up to date by Shaffrey and Roe (2011).

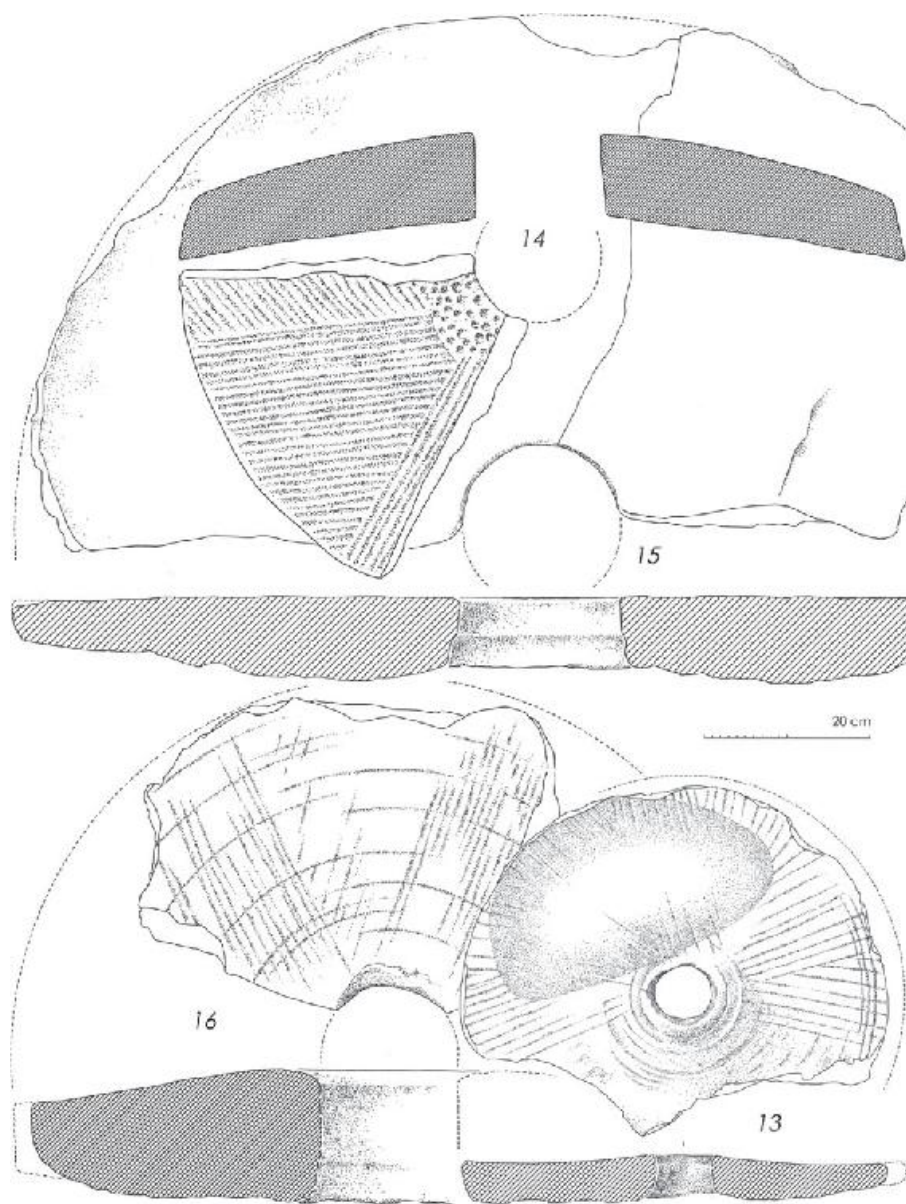


Fig. 8.5: Millstones (13–16) in Folkestone greensand. (Scale 1:8).

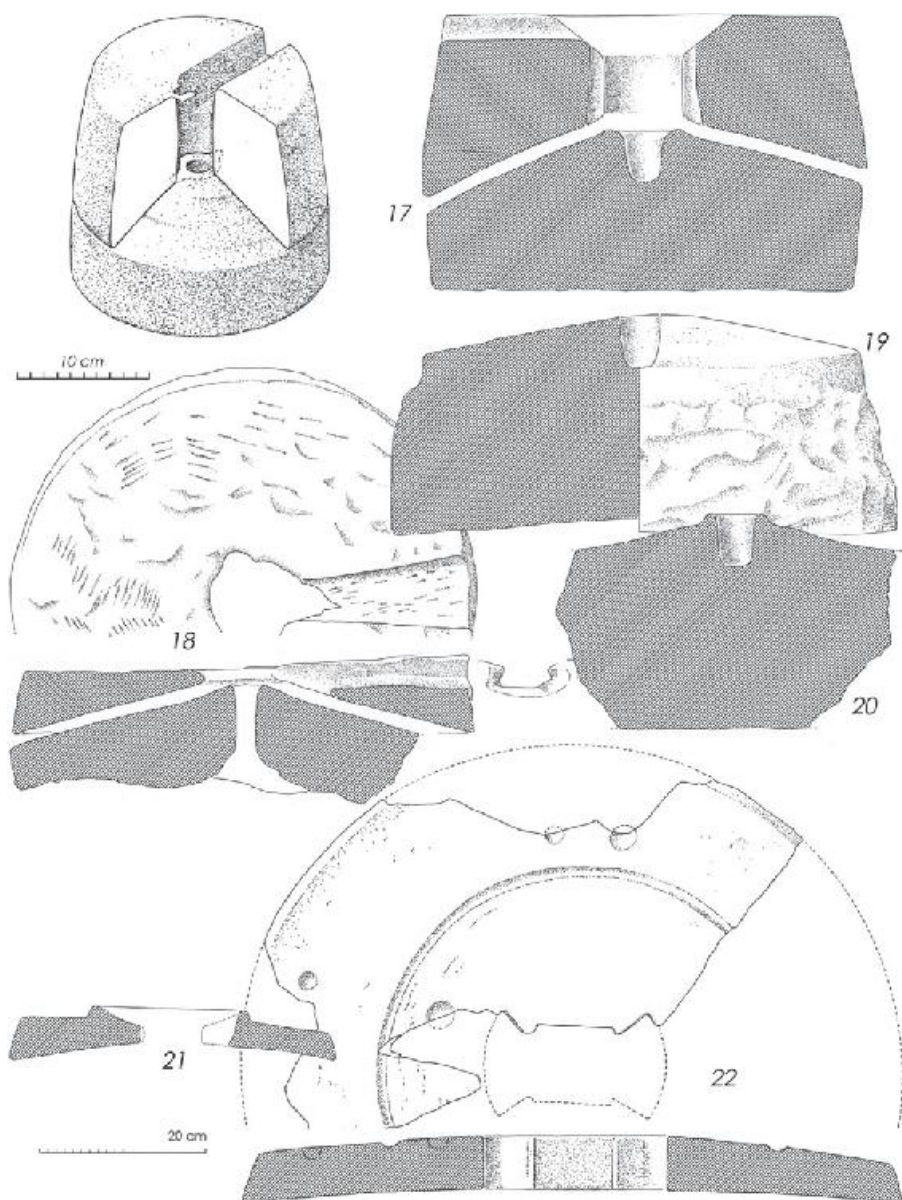


Fig. 8.6: Lodsworth greensand querns (17–20, scale 1:5); and millstones (21–22, scale 1:8).

The rock is a 'hard medium-grained, greenish-grey or brownish grey, silicified, glauconitic, quartz sandstone with characteristic swirls and stringers of dark cherty material' (Peacock 1987, 62). The cherty matter stands proud on the grinding faces, and apparently obviates the need to dress the stones. The rock belongs to the Hythe Formation of the Lower Greensand (Lower Cretaceous, Aptian stage), but must be a very localised development. Peacock found, again and again, that

other Lower Greensand facies were simply too soft for quern- and millstone-making.

Production started in the Bronze Age, when saddle querns were a common product, with a distribution radius of up to 100km. In the late Iron Age and early Romano-British periods, drum-shaped rotary querns of limited diameter (30–35cm) with a handle slot on the top surface become ubiquitous: they are illustrated as 17–20, and constitute most if not all of Curwen's 'Sussex-style' querns. Normally they are excavated in fragmentary and well-used condition (the Bishopstone example (18) is completely worn out), but the part finished example illustrated from the quarry site, and a fragment from Holmbury (19, 20), show just how thick the stones were when new.

Later Roman discoid querns in Lodsworth rock have been recognised more sporadically and require much further work. Examples with 'collared' hoppers are known from Portchester (21; occupation began there after AD 250), and there is a fine large millstone from Littlehampton (22). Together the late Iron Age and Roman Lodsworth stones had a huge sale across central southern England and up to 150km into the south Midlands, a distribution plotted by Shaffrey and Roe (2011), and still growing. The importance of the source is shown 57km away at Silchester (NE Hants), where only querns made from Old Red Sandstone Conglomerate were more common in a very large sample (Shaffrey 2003; 2006). But no Saxon or later products are known, and it must be supposed that the quarry or quarries became overgrown and lost, whereas the sea constantly supplied new exposures on the shore at Folkestone.

Pen Pits greensand

Upper Greensand sources are lacking in south-east England, because the formation is thin and soft, and the more massive stone beds potentially suitable for quern and millstone production only occur to the west. It is possible that discoid querns from the Upper Greensand (Lower Cretaceous, Albion) source at Pen Pits, Penselwood, Wiltshire, may sometimes occur in the South-East, but the numbers would be very few, and it is not possible to cite a definite example. The rock is superficially similar to Lodsworth greensand but lacks the brown cherty clasts (Fig. 8.2; Crawford 1954, 100–2; Peacock 2013, 63–4).

French Puddingstone

The south and east are naturally the most likely places to find

imported querns in England, and in the late Iron Age and perhaps early Romano-British times French *poudingue* filled a special role as it was an exceedingly hard rock, probably capable of producing fine, almost grit-free flour, and was long-lived as a result. The existence of these querns has only recently been recognised, as they have been mistaken for Hertfordshire Puddingstone, a counterpart also present in our region, and discussed below. But it can clearly be shown that the French stones are earlier than the Hertfordshire products, and were the basis of an entire industry as it moved from Haut Normandie to Worms Heath in Surrey (below), and finally to Hertfordshire.

French puddingstones are an Eocene silicified conglomerate (a silcrete). Like the Hertfordshire rock it is very local in occurrence and was formed as concretions no more than a very few metres in diameter. The lithology is distinctive: small rounded dark grey to black flint pebbles (from a fossil shingle beach or nearshore shoal) aptly termed *galets centimétriques* by French geologists, cemented by grey to almost white medium quartz sand, with interstitial silica. A proportion of specimens, both in England and France, surprisingly contain rather abundant hollow moulds of fossil molluscs indicating mainly brackish conditions equivalent to the Blackheath Beds of the London Basin (Ypresian stage; ‘Sparnacien’ in many French publications). Three areas of occurrence are documented in the regional *Carte Archéologique* for Seine Maritime (Rogeret 1997): the Forêt de La Londe, on the left bank of the Seine above Rouen; Saint-Saëns, some 40km south of Dieppe, and two sites south-west of Yport, near Fécamp on the Normandy coast (Fig. 8.2). The lithology of specimens found in Britain suggests this last grouping as the source of most exports, as does its coastal location.

With practice it is easy to distinguish the French and English puddingstones: the French has smaller, darker flints, a more saccharoidal matrix rather than the chert-like material of much Hertfordshire puddingstone, and of course fossils, when present. The ‘handle’ socket of French stones is invariably bored through to the central perforation, and often worked oval or sub-square; the English never so; and the French stones are usually larger overall. French lower stones are normally perforated through; English rarely. Distribution is another guide: any puddingstone quern occurring to the south of the North Downs is likely to be French. The distribution can only be sketchily known but includes the Isle of Wight, Hampshire, West Sussex, and Kent. There is a further sporadic

distribution in East Anglia, Hertfordshire, Bedfordshire and Cambridgeshire, with significant concentrations in coastal Essex and probably south Suffolk.

The distribution in northern France is very imperfectly known, but *meules en poudingue* are ubiquitous in Seine Maritime, and not at all uncommon 150km to the east in Boulogne and 250km east in the Aisne Valley (Pommepuy 1999). Countless numbers must have been produced. Dating ranges from at least the early 1st century BC in France, though probably earlier (saddle querns are common), but English imports, where the date is known, tend to be of Augustan date and in at least two instances have been found in association with Dressel 1B wine amphorae. As so often the greater difficulty lies in estimating the end of production; there is a small 4th-century AD millstone in the Isle of Wight (Tomalin 1987, 88 and 94, G10), but it has no known parallel in England or in France.

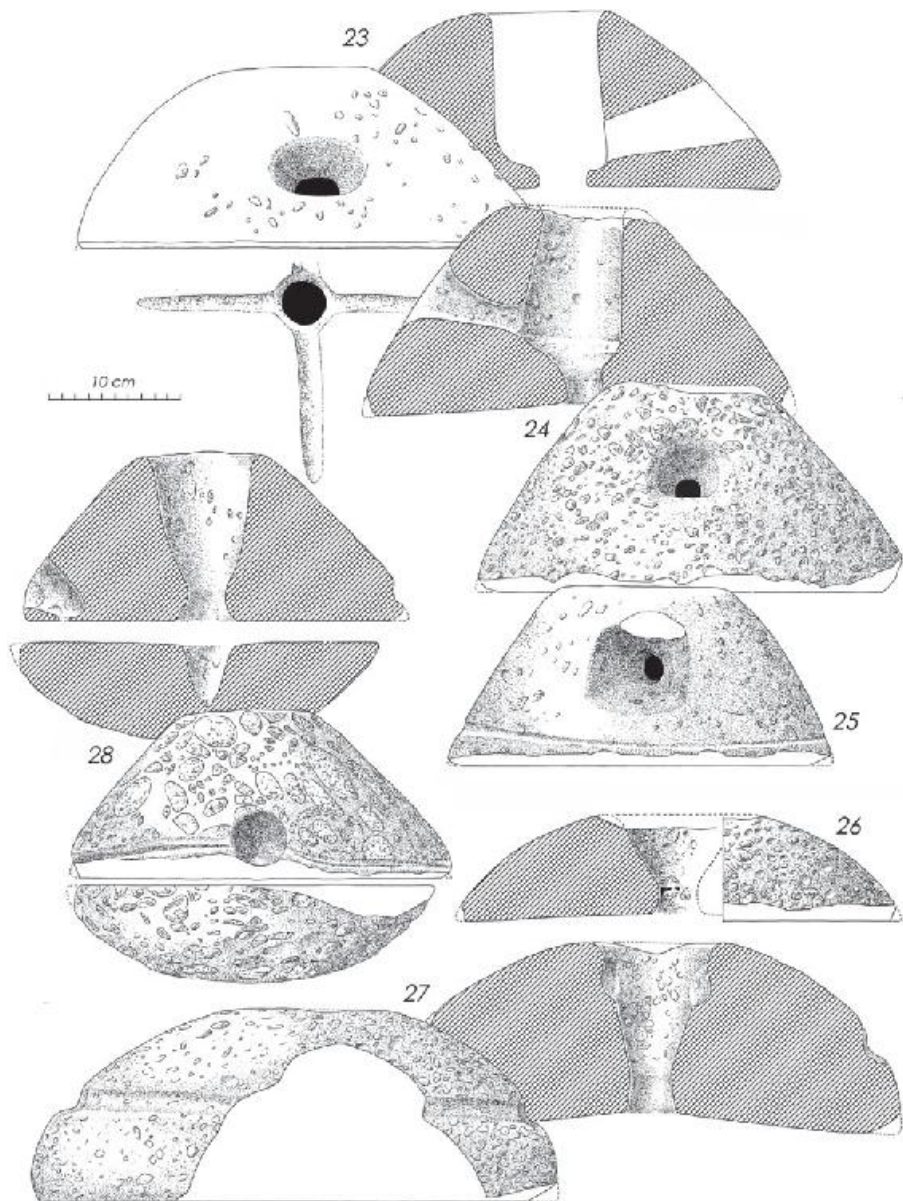


Fig. 8.7: French Poudingue querns (23–27) and Hertfordshire Puddingstone quern (28). (All scale 1:5).

The forms of French puddingstone querns found in England are mainly cones (23–25) or domes (26, 27). Not uncommonly the stones found in England prove to have been little used: hence the domed specimen from north or east Hertfordshire (27) provides much the fullest profile of its type.

Worms Heath Puddingstone

Worms Heath Puddingstone is Surrey's contribution. As long ago as 1953 O. G. S. Crawford published his view that the Heath had been a Romano-British quern quarry, but he could not recall the evidence he was certain he had once seen, and so local archaeologists failed to follow up his strong hint (Crawford 1954, 105). But a study of the Kent and East Anglian material by the author and David Peacock shows that he was quite right, except possibly in respect of date.

Worms Heath lies to the south of Croydon, at the second highest point on the North Downs (NGR: TQ 3858; [Fig. 8.1](#)). Its barren and blasted nature was due to a very freely draining outlier of ferruginous Eocene sand and gravel (Blackheath Formation, Ypresian Stage). In post-medieval times the Heath was common land, increasingly quarried for road-making gravel and later for concrete aggregate; now it is largely worked out and the quarries have been backfilled. Among this material were large masses of concretion, whose dark red or purplish finely sandy matrix contrasts with characteristic rounded flint pebble clasts, many of which are 20mm in length and sometimes more, white, crazed and partially desilicified: 'rotten flints' in geological parlance. Although it is a conglomerate, and may be vernacularly termed 'puddingstone', the Worms Heath rock is a ferricrete, not a silcrete like its Norman and Hertfordshire relatives: the silty-sandy matrix is indurated with iron oxides, not silica. This rock looks and probably was very difficult to work: it is extremely tough and only yields to a very heavy hammer blow. The concretions were mined in bell pits, whose remains contributed to the charming but absurd Victorian whimsy of prehistoric pit dwellings (Johnson and Wright 1903); several hollows survive undamaged on the north side of the Heath.

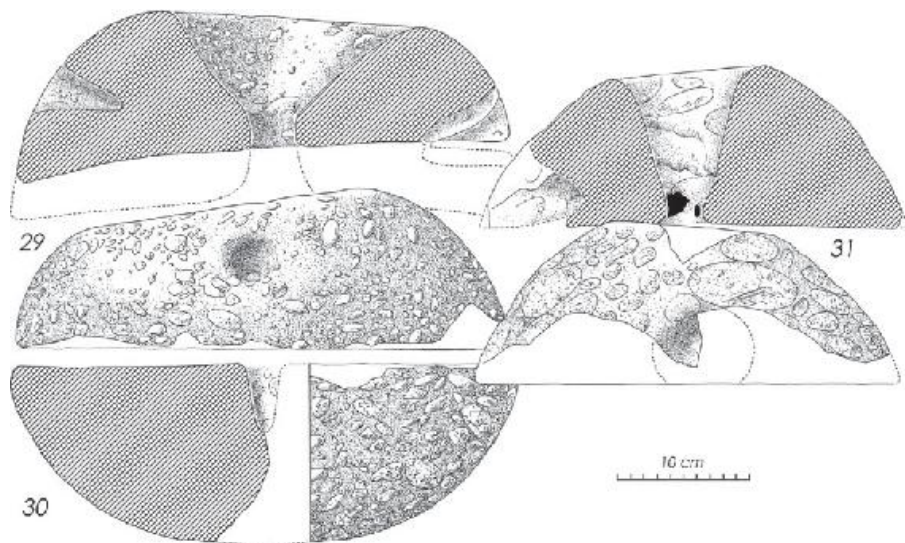


Fig. 8.8: Worms Heath Puddingstone querns (29–31). (Scale 1:5).

Three factors encourage the belief that the Worms Heath quarry was directly or indirectly operated by the Gallo-Roman industry of Normandy: its position south of the Thames; the size and form of its products, which are shown as 29–31; and their early date, which can frequently be shown to be pre-conquest. The distribution is strange: extremely few examples are known to the west of the quarry, particularly in the home county of Surrey, where however they may be poorly preserved, since Worms Heath Puddingstone oxidises ungraciously in acid soils. Much the strongest distribution is in Kent, at the small town of Springhead (Shaffrey 2011; here some if not all must be of post-conquest date), and at Canterbury. There are sporadic finds elsewhere. Along the estuary to the north of the North Downs, Worms Heath and Hertfordshire Puddingstone querns are present in roughly equal quantities, though not necessarily of the same date. Thus in recent excavations at Stone Castle (north Kent) there were two of each (pers. comm. K. Hayward), while at Mucking (south Essex) there were at least eight and six respectively (personal inspection; Buckley and Major forthcoming). But older archaeological records failed to distinguish between these patently distinct lithologies, and museum curators then generally lost the objects themselves. There is a further distribution in East Anglia, but more sporadic than that of French puddingstone.

The date and distribution of Worms Heath Puddingstone encourage the view that its working was abandoned once Hertfordshire Puddingstone had started to be exploited, essentially after the

conquest. The Worms Heath rock was simply poor, while the Hertfordshire was excellent.

Hertfordshire Puddingstone

As will have been gathered, Hertfordshire Puddingstone querns, whose production areas are shown in [Fig. 8.1](#), are a minor component of the overall supply south of the Thames, having a sparse distribution in north Kent in post-conquest times, and perhaps not much later than AD 100 (Major 2004). A typical example, with paired stones, is illustrated (28). The rock is a classic flint conglomerate and silcrete of the uppermost Palaeocene Upnor Formation, formed almost one million years before its French counterpart, but probably by a very similar – and complex – geological mechanism which indurated the sand and flint pebbles with silica after the uplift of the shoreline sediment. The distinguishing features are well-rounded frequently red/brown/toffee-coloured flints (though with grey-black rinds), of 20mm or sometimes much more in a very fine and entirely silicified generally light grey matrix. Fractures often, and distinctively, run through matrix and flint clast alike, and even through individual grains of sand. Handle sockets never penetrate to the central perforation, but are blind, and the same can be said of the spindle sockets of 95 per cent of lower stones; just a few early examples are drilled right through.

Millstone Grit and Old Red Sandstone

In almost any assemblage of querns and millstones from the south of England, archaeologists should be alert to far-travelled examples of Carboniferous Millstone Grit and Old Red Sandstone Conglomerate at any date ([Fig. 8.2](#)). Millstone Grit is the customary appellation for a number of visually similar coarse sandstones from Derbyshire and Yorkshire characterised by pale grey, ochre, or pinkish densely-packed angular quartz and feldspar sand, coarse sand, or grit, whose sharpness can be felt in the hand specimen. Old Red Sandstone Conglomerate stones are hard grey or brownish Devonian sandstones with conspicuous white rounded quartz pebbles and other metamorphic rock fragments, mainly from the Forest of Dean and Wye Valley (Shaffrey 2006). Although they will only be a small component in the South-East, both were produced in great numbers, and were obviously so effective that they travelled widely.

Mayen lava

Having addressed the main types of late Iron Age rotaries and Romano-British querns, it is time to turn to their nemesis, the lava quern and millstone.

The dark grey vesicular lava of querns and millstones is a basalt in which pressure has been sufficiently released during near-surface cooling to form myriad gas bubbles. These lighten the rock (by a factor of some 25 per cent at Mayen), make it easier to cut an otherwise intensely hard stone, and form a series of sharp and naturally refreshed cutting edges as the quern or millstone wears down. The Pleistocene lava fields at Mayen, near Koblenz ([Fig. 8.2](#)) contain a horizon of excellent rock between the fractured surface material and the denser basalt at depth, and this has been used for milling from the Neolithic until the First World War (Crawford and Röder 1955; Peacock 2013, 151–4). Alternative archaeological names are Neidermendig and Andernach, but Mayen is more correct. It will be seen from [Fig. 8.2](#) that in addition to its other qualities, Mayen enjoyed the huge advantage of proximity to Europe's great waterway, the Rhine, and this explains its domination of the mid- and later-Roman quern and millstone trade in London and the South-East.

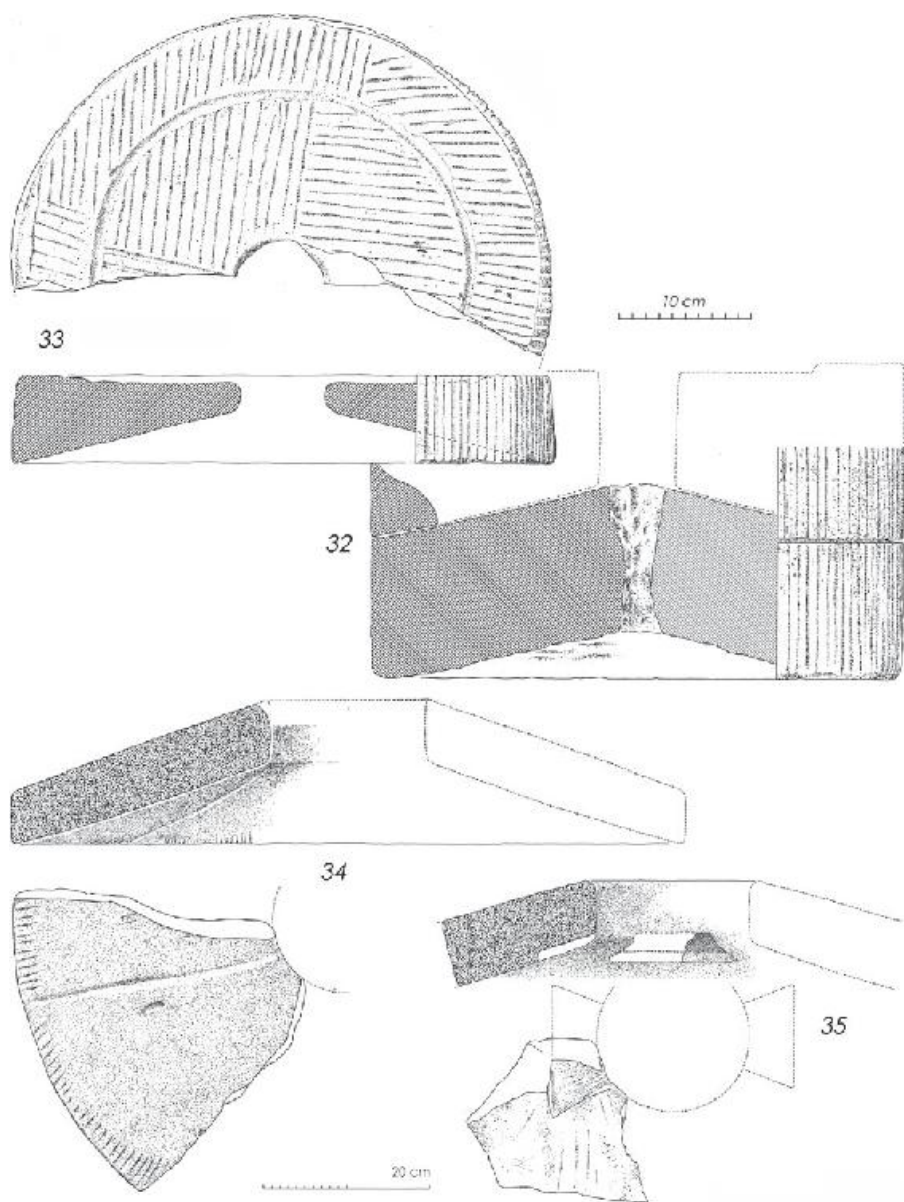


Fig. 8.9: Mayen lava querns (32–33, scale 1:5) and millstones (34–35, scale 1:8).

Mayen was by no means the only lava field producing querns and millstones; other sources are outlined by Peacock (2013, 86–92, 154–8), but they are not distinguishable in the hand. Thin section and, increasingly, geochemical analysis is used to determine lava sources, but this is not practical when dealing with site material, often in some bulk. Fortunately, sufficient determinations have been made to suggest that Mayen so dominated the British supply that it is

unnecessary to check for other sources unless an unusual or highly significant piece, like a 'Pompeian' donkey mill, is involved. A further observation is necessary for lava querns and mills: their survival is notoriously poor, and only small pebbles and crumbs may be recovered, possibly as a result of exposure to frost rather than soil conditions. For this reason, the examples figured as 32–35 are illustrated from well-preserved excavated material at Verulamium (Hertfordshire), which will also have been traded through London.

It was formerly believed that Mayen lava querns, essentially of form 32–33, were military equipment, and characterised the earlier years of Roman Britain. They were certainly extensively used by the military, and are perhaps best-known in Britain from the abandoned fort of Newstead in the Scottish Borders (Curle 1911, 145). But a more balanced view is that they were increasingly adopted by the general population, were imported over a long period, and led to the decline or demise of the greensand and puddingstone querns we have so far discussed. Hertfordshire Puddingstone querns are perhaps the best example: they must have been extremely difficult (and therefore expensive) to make, but provided almost grit-free flour and had a long life. Lava was easily cut, produced gritty flour (it is said to have coloured it grey), and wore out quickly; but it was cheap, and succeeded. So Mayen lava is likely to dominate many Romano-British assemblages in the east and south of England. It is a strong presence in the great Romano-British towns: at Canterbury, for example, it is rather more common overall than Folkestone greensand, despite the great distance from the rock source: 500+ km instead of less than 25 km.

The supply appears to have been imported through Londinium. The supply of querns and millstones to Roman London has been known more by the heart than the head, partly due to the piecemeal nature of excavation there, and partly because its hinterland is overlain by modern conurbation to an average radius of 20 km. But a strong impression that Mayen lava was predominant has been strengthened by the finds at No. 1 Poultry in the heart of the modern City (Hill *et al.* 2011; Williams and Peacock 2011a). Excavations between 1995 and 1998 recovered over 1000 fragments (many substantial) from Mayen lava querns of the precise form of 32–33, which had been used to make successive pathways and yard surfaces around AD 75–80. All were unused, and it is hard to account for their disposal as paving material: could they have met with some misfortune (pollution in its

broadest sense) which unfitted them for civilised use? But whatever the reason for their abandonment, the clear message is that the querns were imported from Mayen to Londinium in bulk, and we probably need look no further for the immediate source of the south-eastern supply. One imagines that towns like Canterbury or Chichester were supplied by part loads shipped back around the coast from London. There is another likely point of entry, at Colchester, where lava querns abound in the archaeological record. The town is on the east coast, facing the Rhine, and was the provincial capital in its early years. But bulk importation in London by the AD 70s suggests that Colchester supplied a smaller East Anglian hinterland.

The discovery of so many querns raises the question of the state of finish in which they were imported. The answer appears to be that most of the work had been done in Mayen: the upper surfaces of top stones are uniformly finished (purely decoratively) like 33, and the grinding surfaces are usually dressed in four sectors of harps. But Roach Smith collected small lava millstones, probably also from London Walbrook sites, in the 1840s and 50s, and one is not perforated: it had been imported thus so that a local millwright could fit it to the mill which bought the stone (British Museum [18]57 7–1 1058).

Until very much better excavation data is forthcoming we cannot tell how long lava querns like 32–33 continued to be made and imported. It is becoming clear though, that the use of millstones (*i.e.* mechanical mills) was an innovation of the 2nd and later centuries AD, part of the growth of seigniorial landholding. Lava millstones, like 34–35, are a strong presence in eastern Britain, and will have been used in the south and east even if the evidence has often crumbled. They range from 50cm to one metre in diameter, and generally have substantial ‘dish’ (*i.e.* their grinding surfaces form shallow cones). Rynd chases, as seen on the underside of 35, indicate a geared drive, but it cannot be assumed that such large stones were used in watermills; the indication is rather that most were animal driven (Peacock 2013, 111–17).

It has been seen that both Lodsworth and Folkestone also supplied large millstones, and there was a further supply, 200+ km distant, in the form of Carboniferous Millstone Grit from Derbyshire and Yorkshire. Millstone Grit stones were in use at Folkestone Roman villa (2010–11 excavations), and another reached Boulogne (Musée de Boulogne, seen in 2012). It may prove that that mills were more likely

to use indigenous rocks than households, and that Mayen lava made less headway as millstones, so far from the rock source.

Other sources

In excavating well away from a large Roman town or from a dominant rock source, one is certain to encounter querns and millstones made from less suitable local materials which are well worth tracking to source, but nonetheless remain local and of less importance in the greater scheme, especially if the local industry had little chronological depth. Their interpretation may not be straightforward. For instance excavations at Brading Roman Villa in the Isle of Wight (NGR: SZ 5986) showed that Lodsworth was the dominant source of supply, but was supplemented with ferruginous sandstone (?Carstone, Cretaceous, Lower Albian) querns from the Island (Cunliffe 2013, 220–3; Tomalin 1987, 89 and 94, G24–28). Was this born of desperation; or was the ferruginous sandstone used for a lesser task, like rough-grinding meal for animals, or for slaves? (In post-medieval Scotland mills usually had a separate pair of stones for animal feed.) A similar question arises in east Kent, where rudimentary millstones were split from the calcareous sandstone doggers which crop out in the Palaeocene Thanet Sand in the cliff just west of Reculver (NGR: TR 2169; illustrated as 37; a much larger example found in Canterbury is 90cm (three feet) in diameter). Only the hardest of these consolidated masses could have been used, but even then the suspicion is that it would have shed fine-medium silica sand into the flour at an alarming rate.

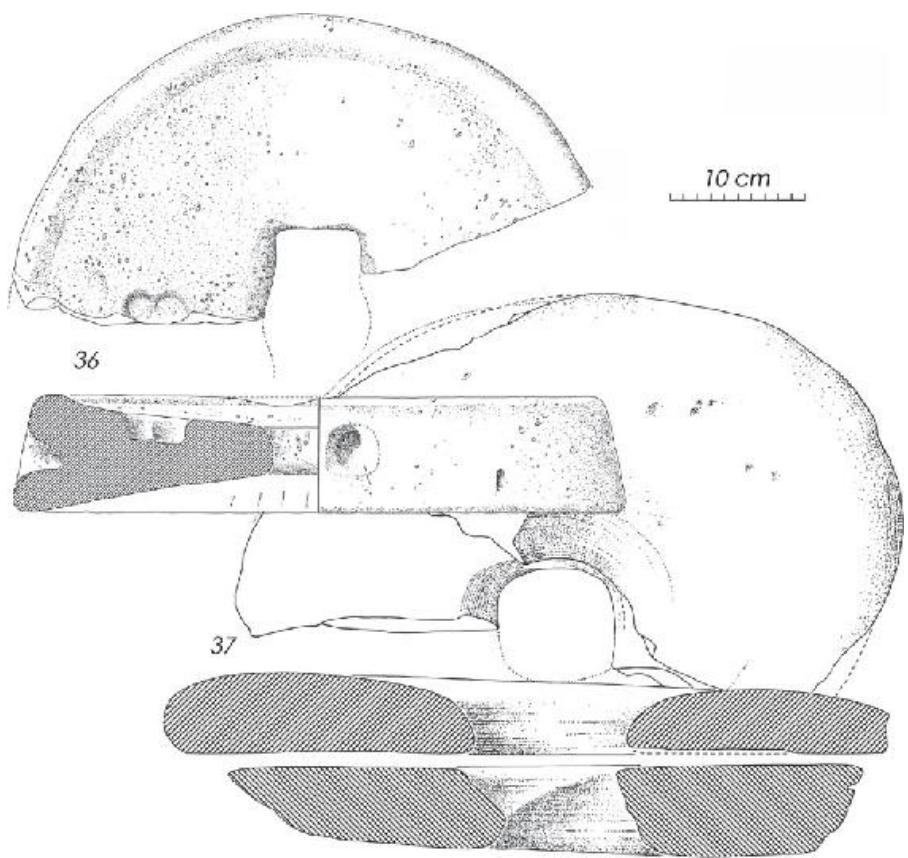


Fig. 8.10: Querns/millstones from Vauxrezis (36) and Reculver (37). (Scale 1:5).

Another desperate measure was to make a quern of Sarsen, the relict Eocene quartz sandstone found as isolated blocks on or near Chalk Downland in parts of this area. Sarsen is hard, in fact too hard for this use, and had a reputation for ‘spitting’ when being worked. It is also suspected that its grinding surfaces tended to glaze rather than cut grain. All that can be said is that the stones would last a long time. Most are large, like the late Iron Age rotary seen from excavations at Mucking (south-west Essex), and they tend to occur where sarsen is found, so presumably they were little traded.

Finally, we should be aware of the possibility of ‘new’ sources: new, that is, to us. South-East England lies close to France, where unfamiliar rocks were employed by quernstone industries in the Paris Basin. Picavet and Frongeau (2011) have described several, and the first fruit in England has been recognition by the author of a quern from Vauxrezis, outside Soissons, in Roman deposits in the City of London (36 and [Fig. 8.2](#)). As it is made from a white middle Eocene

gritty limestone bearing nummulites and solitary corals, no competent geologist could mistake it for an English product, and it must have been a rarity. But it points us in the right direction, away from a view of smallholders and slaves battering rude stones into shape on their doorsteps, and towards the advanced organisation and trade of the Iron Age and Roman economies.

Acknowledgements

I would like to thank Paul Bennett, David Buckley, Lyn Cutler, Chris Evans, Kevin Hayward, Sam Lucy, Hilary Major, Michael Marshall, Keith Parfitt, Liz Pieksma, Andrew Richardson, my wife Beth Richardson, and Ruth Shaffrey for their help with this survey. Canterbury Archaeological Trust has allowed prior publication of material from its excavations at East Malling and Thanet Earth, and Museum of London Archaeology and the site owners Ten Times Ten Ltd. have allowed prior publication of the Vauxrezis quern from No. 100 Cheapside, City of London.

Professor David Peacock, who read this paper before his death in March 2015, was many a student's inspiration in the unravelling of querns and millstones, and led or shared in the investigations whose results are summarised here. He is very sadly missed.

Appendix: illustrated examples

3: Late Iron Age Ragstone rotary quern from Harrold, Beds (Bedford Museum; Eagles and Evison 1970).

4–5: Folkestone greensand late Iron Age querns from near Bishops Stortford, Hertfordshire (Bishops Stortford Museum).

6–8: Unfinished Folkestone greensand querns from beneath Folkestone Roman villa: 6–7 late Iron Age; 8 early Romano-British (Canterbury Archaeological Trust).

9: Worn lower stone of early Romano-British Folkestone greensand quern from Harrold, Beds, showing iron spindle and natural irregularities beneath (Bedford Museum).

10: Worn upper stone of early Romano-British Folkestone greensand quern from Brenley Corner, near Canterbury, Kent, showing 'rynd' seating, driving socket, and crude harp-dressing (Canterbury Museums).

11: Early Romano-British mortar in Folkestone greensand from Marlowe Theatre excavations in Canterbury 1982 (Canterbury

12: Lower stone of Roman-British Folkestone greensand quern from occupation deposits, Folkestone Roman villa, 2010–11 (Canterbury Archaeological Trust).

13: Lower stone of Roman-British large quern/small millstone in Folkestone greensand; excavations at Glaxo Smith Kline site 1275, Ware, Herts, c. 2010.

14: Upper stone of late Roman-British millstone in Folkestone greensand; excavations at Ickham, near Canterbury, Kent (after Spain and Ridder 2010, 277–289).

15–16: Two lower stones of late Roman-British millstones in Folkestone greensand from excavations at Thanet Earth, near Margate, Kent (Canterbury Archaeological Trust).

17–20: Paired and lower stones of late Iron Age Lodsworth greensand querns of Curwen's 'Sussex' style: 17 Burpham, Surrey (Guildford Museum AS 131; after Tomalin 1977); 18 Bishopstone, East Sussex, after Bell 1977, 24–5; 19 unfinished stone from Lodsworth quarry site after Peacock 1987; 20 Holmbury, Surrey (Guildford Museum AS 120; after Tomalin 1977).

21–22: Later Romano-British millstones in Lodsworth greensand from Littlehampton, West Sussex, after Gilkes 1993.

23–27: Late Iron Age and early Romano-British querns in French *poudingue*: 23 Worthing (Worthing Museum, redrawn from Lewis 1960 and photographs); 24 Colchester or Essex (Colchester and Ipswich Museums); 25, Evreux area (Musée de Évreux); 26 pre-villa deposits at Folkestone Roman villa (Canterbury Archaeological Trust); 27 north or east Hertfordshire (North Herts Museums).

28: Paired Romano-British Hertfordshire Puddingstone quernstones from Feltwell Southery Fen, Norfolk (private collection).

29: Upper stone of Worms Heath Puddingstone quern, north-east Essex (Saffron Walden Museum).

30: Lower stone of Worms Heath Puddingstone quern, High Speed Rail excavations at Springhead, Kent (Shaffrey 2011).

31: Upper stone of Worms Heath Puddingstone quern, Fordwich, near Canterbury, Kent (Canterbury Museums).

32–33: Querns in Mayen lava: 32 unused example; 33 well-worn upper stone with decoration (Romano-British, Verulamium, Herts; Verulamium Museum).

34–35: Millstones in Mayen lava: 34 with harp-dressing largely worn out; 35 showing rynd chases for geared drive (Romano-British, Verulamium, Herts; Verulamium Museum).

36: Upper quernstone in Vauxrezis nummulitic limestone (near Soissons, northern France), excavations at 100 Cheapside, City of London (Museum of London Archaeology).

37: Paired quernstones made from Thanet Sand doggers from Reculver, Kent, excavations in East Malling, Kent (Canterbury Archaeological Trust).

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Chapter 9

The Exploitation of Animals and Their Contribution to Urban Food Supply in Roman Southern England

Mark Maltby

Introduction: the scope of this chapter

This chapter will provide a brief synopsis of the evidence for the exploitation of domestic animals in major towns in southern England during the period of Roman occupation and rule of this region. The towns included in this survey are Exeter, Dorchester, Cirencester, Gloucester, Winchester, Silchester, Chichester, Colchester, St Albans, London (including Southwark) and Canterbury. The discussion will be mainly based on evidence derived from urban excavations that have taken place in these towns over the past 40 years. This paper will provide an update of the evidence presented in a previous review by including more recently excavated assemblages and some reports that were overlooked in that survey (Maltby 2010, 255–304). This review will focus only on domestic stock (cattle, sheep, goat, pig, horse, poultry). It will also only briefly consider evidence for animals found with burials in urban cemeteries and other animal depositions that may have been associated with ritual activities. For more detailed discussions about wild species and/or depositions of animal bone groups in Roman Britain, readers are referred to other surveys (Fulford 2001; Grant 2004; King 2005; Locker 2007; Maltby 2010; 2012; 2015; Morris 2011).

Although this review will focus on towns, reference will be made where appropriate to other types of settlement. Towns relied very heavily on the countryside for their provisioning and the demands of the urban populations significantly influenced the development of farming and the distribution of its produce.

The urban assemblages

This survey is based on the animal bone reports from over 70 sites from 13 towns. The reports vary greatly in the size of the assemblages, the methods of analysis, and the depth and detail of reporting. [Table](#)

9.1 provides the basic data about the number of bones from those assemblages which include quantification of the domestic mammals. Counts are usually based on the number of identified specimens (NISP). These are raw counts based on the original reports. It should be borne in mind that different analysts count different suites of elements. For example, many do not include most of the vertebrae and ribs; some include loose teeth whilst others exclude them. It is often impossible from the information available to manipulate the data into a standardised count. Some counts are based on a selected suite of elements. In broad surveys of this type, it is generally assumed that these variations in recording do not significantly affect the relative abundance of species represented. Comparisons of the results from NISP counts and a selected suite of elements at Winchester showed close similarities in the percentages of species calculated (Maltby 2010, 97–102). Here and elsewhere, however, it has been shown that NISP calculations usually favour cattle whereas estimates of minimum number of individuals usually produce higher percentages of sheep and pig than NISP counts from the same assemblages. Where known, bones in large associated groups (partial and complete skeletons) have been excluded from the counts. Most of the counts are based on hand-collected assemblages only. Again, these are likely to be biased (to an unknown extent) towards larger bones, meaning that sheep, pig and birds are under-represented. Preservation factors are also biasing factors that are difficult to control in reviews such as this. More fragile elements are undoubtedly under-represented, as can be shown in published element counts from these sites (e.g. Maltby 2010, 91–2; Ingre 2011, 246–8).

Table 9.1: Domestic mammal bones recovered from major Roman towns in southern England

Town	Site	Period	Cow	S/G	Pig	Horse	% Cow	M S/G	M Pig	SP	H.C	Source
Canterbury	Castle	60-90	719	415	398	6	23	40	39	51	0	King 1982
		70-90	195	484	324	8	19	48	32	60	4	
		90-190	198	273	239	9	28	58	34	53	8	
		190-400	196	107	128	5	45	25	30	46	2	
Canterbury	Castle	Total	805	1279	1089	20	25	40	34	54	2	
Chichester	Cattlemarket	C1	396	122	52	6	65	24	10	20	2	Levitan 1989
		C1-2	1756	740	301	57	63	26	11	71	2	
		C2-3	297	388	153	23	60	28	12	21	3	
		C3-4	739	330	208	41	58	26	16	61	5	
		C4-5	2255	1262	499	70	56	31	12	72	3	
Chichester	Cattlemarket	Total	5873	3822	1213	177	59	28	12	70	3	
Chichester	Market Road	RB	47	20	12	9						Hamilton-Dyer 2004
Chichester	Rowes Garage	C1-2	166	31	17	7	78	14	8	65	4	Seager Smith et al. 2007
Chichester	All	Total	6086	2873	1242	193	60	28	12	70	3	
Cirencester	33 Sheep St	C1-2	425	349	163	5	45	37	17	68	1	Maltby 1988
		C2-3	97	94	37	2	43	41	16	72	2	
		C3-4	170	107	75	8	48	30	21	59	4	
		Total	692	550	275	15	46	36	18	67	2	
Cirencester	33 Sheep St	Total	692	550	275	15	46	36	18	67	2	
Cirencester	Cemetery	C2-3	287	129	59	8	81	13	6	89	1	Thawley 1982b
		C3-4	381	31	30	0	86	7	7	51	0	
		Total	1168	160	89	8	82	11	6	64	1	
Cirencester	Cemetery	Total	1168	160	89	8	82	11	6	64	1	
Cirencester	Chester St	C1-2	152	105	95	2	43	30	27	53	1	Maltby 1988
		C3-4	2809	116	123	8	92	4	4	49	0	
		Total	3021	221	218	10	87	6	6	50	0	
Cirencester	Chester St	Total	3021	221	218	10	87	6	6	50	0	
Cirencester	Military	M-LL	391	260	142	12	49	33	18	65	3	Thawley 1982a
Cirencester	Querns Road	C2	162	156	76	10	40	41	19	60	6	Maltby 1988
Cirencester	Querns Road	C3-4	216	238	84	16	43	41	17	21	2	Levitan 1990
		Total	378	378	162	26	41	41	18	70	6	
		C1-2	2262	351	335	10	76	12	11	52	0	
Cirencester	St Michael's	C3	1044	614	445	16	50	29	21	58	2	Levitan 1990
		C4	1074	550	472	9	51	26	23	54	1	
		Total	4980	1525	1252	35	61	21	17	53	1	
Cirencester	St Michael's	Total	4980	1525	1252	35	61	21	17	53	1	
Cirencester	Staircase Lane	LC1-2	204	181	58	4	46	41	13	76	2	Hamilton 2008b
Cirencester	Trinity Road	C3-4	390	46	36	10	81	11	8	56	3	Hamilton 2008b
Cirencester	Beeches Rd CQ-CX/CY	C4	504	136	87	15	69	19	12	61	3	Levitan 1986
		C4	453	272	228	27	48	29	24	54	6	
		Total	957	408	315	42	57	24	19	56	4	
Cirencester	Beeches Rd	Total	957	408	315	42	57	24	19	56	4	King 1986
Cirencester	All	Total	11150	3467	2405	150	66	20	14	59	1	
Colchester	Balkerne Lane	60-150	3488	1325	738	55	63	24	13	64	2	Luff 1993
		100-300	6813	692	438	29	86	9	6	61	0	
		150-400+	5100	1824	1291	47	62	22	16	59	1	
Colchester	Balkerne Lane	Total	15401	3839	2467	131	71	18	11	61	1	
Colchester	Burr Road	200-320	63	48	101	14	30	23	48	32	18	Luff 1993
		200-400+	66	47	88	7	33	23	44	35	10	
		320-100+	478	348	533	33	55	26	39	40	6	
Colchester	Burr Road	Total	507	443	722	54	34	25	41	38	8	
Colchester	Culver St	60-150	596	579	728	10	52	29	39	43	2	Luff 1993
		60-225	314	281	166	6	41	37	22	63	2	
		75-300	416	432	782		26	27	46	36	0	
		100-350	192	127	184	1	38	25	37	41	1	
		150-400+	761	567	734	17	38	27	35	44	2	
Colchester	Culver St	Total	2329	1988	2844	34	33	29	38	43	1	

Colchester	Gilbert School	50-100	21	45	28	0							Luff 1993
		60-82%	900	446	451	5	36	32	32	50	1		
		110-350	142	96	138	3	38	26	37	41	2		
Colchester	Gilbert School	Total	863	586	617	8	36	31	33	49	7		
Colchester	Head St	43-49 (Mil)	95	26	93	1	44	12	43	22	1	Curl 2004	
		49-61	118	79	26	1	53	35	12	75	1		
		L1-L3	324	190	206	8	45	26	29	48	2		
Colchester	Head St	Total	537	295	325	10	46	25	28	48	2		
Colchester	Lion Walk	R8	784	497	458	15	45	23	26	52	2	Luff 1993	
Colchester	Long Wyre St	C1	113	47	80	3	47	20	33	37	3	Luff 1993	
Colchester	Middleborough	R8	113	86	87	9	40	30	30	50	7	Luff 1993	
Colchester	All	Total	20947	7779	7400	264	58	22	21	51	1		
Dorchester	Charles St	C1-2	197	410	94	5	28	58	13	81	2	Maltby 2010	
		C3-4	450	646	243	11	34	48	18	73	2		
		Total	647	1056	337	16	62	106	31	154	4		
Dorchester	Wessex Court II	C1-2	281	434	227	5	30	46	24	66	2	Maltby 2010	
		C3-4	190	138	71	5	40	36	24	60	4		
		Total	471	572	298	10	70	82	48	126	6		
Dorchester	Charles St/ WC II	Total	1048	1508	635	16	32	49	19	72	2		
Dorchester	Colliton Park	C1-2	224	557	36	3	27	68	4	94	1	Hamilton-Dyer 1993	
		C3-4	89	135	16	3	37	56	7	89	3		
		C5	182	144	48	14	49	39	13	75	7		
Dorchester	Colliton Park	Total	495	836	100	30	35	58	7	89	4		
Dorchester	Greyhound Yard	60-100	103	241	114	7	22	53	25	68	6	Maltby 1993	
		75-100	2303	2438	1589	52	36	39	25	81	2		
		100-200	366	434	278	2	34	40	26	61	1		
		150-300	1035	1383	946	11	31	41	28	59	1		
		250-400	458	420	330	7	38	35	27	56	2		
		350-450	1855	1636	822	33	49	33	23	57	2		
		400+	565	382	287	19	46	31	23	57	5		
		Total	6688	6454	4346	121	38	37	19	60	2		
Dorchester	Greyhound Yard	60-150	66	112	49	2	30	51	19	28	3	Griffin 2008	
		150-300	66	77	25	0	39	46	15	75	0		
		300+	115	64	31	13	55	38	15	67	10		
		Roman	225	221	64	6	44	43	13	78	3		
		Total	471	474	162	21	43	43	13	73	4		
Dorchester	Hospital	Total	471	474	162	21	43	43	13	73	4		
Dorchester	All	Total	8699	9362	5243	198	37	40	22	64	2		
Exeter	Bartholomew St	100-200	69	14	4	1	63	13	4	78	1	Maltby 1979a	
		55-75 (M)	307	134	127	4	49	31	20	60	1		
		75-100	76	89	75	3	32	37	31	54	4		
		100-200	245	311	236	5	31	39	30	57	2		
		300+	908	375	290	14	55	25	20	56	2		
		55-300+	249	157	67	3	53	33	14	70	1		
		Total	1865	1126	795	29	47	31	22	59	2		
Exeter	Goldsmith St	Total	1865	1126	795	29	47	31	22	59	2		
Exeter	High Street	100-200	55	20	11	0						Maltby 1979a	
		75-150	6	5	5	0							
		100-200	57	9	8	0							
Exeter	Holloway St	Total	63	14	8	0							
Exeter	Rack St	55-75 (M)	10	3	0	0						Maltby 1979a	
		75-100	254	157	51	57	78	16	5	75	7		
		100-200	31	24	5	0							
		100-300	44	13	7	0							
		200-300	25	8	3	0							
		300+	66	33	21	0	55	28	18	61	0		
Exeter	Rack St	Total	930	258	87	57	74	19	7	73	6		

Exeter	St Mary Major	55-75 (M)	119	125	109	0	34	35	31	55	0	Maltby 1979a
		75-100	143	172	124	0	53	39	28	58	0	
		100-200	126	169	148	14	28	38	33	53	10	
		200-300	163	107	143	0	39	26	35	43	0	
		300+	140	43	85	8	52	16	32	34	5	
Exeter	St Mary Major	Total	681	618	609	22	36	32	32	50	3	
Exeter	Trickhay St	55-75 (M)	61	56	40	0	57	40	24	62	0	Maltby 1979a
		75-100	33	37	37	0	31	35	35	50	0	
		75-150	11	6	14	0					0	
		100-200	102	68	41	0	48	32	19	62	0	
		200-300	35	37	33	0	53	35	31	53	0	
Exeter	Trickhay St	300+	589	97	138	17	71	12	17	41	3	Maltby 1979a
		Total	811	311	302	17	58	22	21	51	2	
		All	4344	2339	1817	126	51	28	21	56	3	
Gloucester	East Gate	C1-4	399	158	80	16	63	25	13	66	4	Maltby 1985
		C4	560	284	136	17	57	29	14	68	3	
Gloucester	East Gate	Total	959	442	216	33	59	27	13	67	3	
Gloucester	Eastgate St	C2	1054	1	0	0	100	0	0	0	0	Levine 1986
Gloucester	1, Westgate St	C3-4	217	30	16	4	83	11	6	65	2	Maltby 1979b
Gloucester	All	Total	2270	473	232	37	76	16	8	67	2	
London	Aldgate (Flt 15)	L1-E2	175	7	7		93	4	4	50	0	Watson 1973
London	Amphitheatre	L3-M4	27	3	9	13	69	8	23	25	13	Liddle 2008
		Late C4	825	8	19	37	96	1	3	30	6	
		Total	1022	28	32	70	93	3	5	33	6	
London	Baltic House	50-290	21	12	23	18	38	21	41	34	46	Reilly 2002
		250-500	166	24	74	58	65	8	26	24	24	
London	Baltic House	Total	307	38	97	76	81	11	28	27	27	Armitage 1980
London	Billinggate	C1-2	1272	316	636	24	57	14	29	33	2	
London	Cannon St	C1-4	219	77	225	0	42	15	43	25	0	Pipe 2002
London	E. Cemetery (D-F)	C1-4	458	85	66	276	77	13	10	56	35	Reilly 2000
London	Mithraeum	C2-4	58	28	58	0	53	15	32	33	0	Macready and Sidel 1998
London	1, Poultrey	46-65	214	37	41	8	73	13	14	47	4	Pipe 2011
		65-95	270	44	60	1	72	12	16	42	0	
		95-135	952	93	131	5	81	8	11	42	1	
		135-220	192	20	27	0	80	8	11	43	0	
		220-400	326	56	75	2	70	14	16	47	1	
London	1, Foulry	Late C4	120	19	16	3	77	12	10	54	2	C-Brock/Armitage 1977
		Total	2074	279	353	19	77	10	13	44	1	
		C2-4	896	51	21	4	93	5	2	71	0	
London	Walbrook	Total	6461	907	1512	469	73	10	17	37	7	
Southwark	15-23 Southwark St	M-L C1	46	50	46	5	32	55	32	52	10	Pipe and Rackham 1992
		Late C1	42	48	53	3	29	34	37	48	7	
		C2-3	49	43	58	4	33	29	39	43	8	
		C4	15	13	17	1						
Southwark	15-23 Southwark St	Total	152	154	174	13	32	32	36	47	8	
Southwark	199 Borough H St	C1-4	1413	754	803	2	48	25	27	48	0	Locker 1988
Southwark	Borough H St	C1-2	2967	215	375	7	63	6	11	36	0	Ainsley 2002
Southwark	Tennings Wharf	C1-4	45	29	48		57	24	39	38	0	Reilly 2001
Southwark	Hunt's House	Late C1	4		1	1						Bendrey 2002
		170-190	5	6	1	38						
		190-240	59	11	23	6	63	12	25	32	9	
		240-LC4	1554	49	101	32	91	3	6	33	2	

		LAC-E5C	200	12	30	1	86	4	10	29	9	
		8C	65	3	8							
Southwark	Hare's House	Total	1947	61	164	70	89	4	7	35	4	
Southwark	London Bridge 95	C1-2	632	137	287	20	59	15	27	35	3	Ainsley 2002
Southwark	Winchester Palace	C1-2	61	63	206	2	23	18	59	23	2	Reilly 2005
		C3-4	77	12	59	2	52	8	40	17	3	
Southwark	Winchester Palace	Total	158	75	265	4	32	15	53	22	2	
Southwark	1973-91 sites	50-70	106	43	47	1	54	22	24	48	1	Liddle et al 2009
		70-100	88	141	83	1	20	45	27	63	1	
		120-160	743	214	329	50	58	17	26	39	5	
		200-270	87	50	144	1	31	18	51	26	1	
		270-350	201	44	58	23	66	15	19	43	10	
		Late C4	2251	116	167	7	89	5	7	41	0	
Southwark	1973-91 sites	Total	3476	608	828	73	71	12	17	42	2	
Southwark	All	Total	10790	2073	2944	197	68	13	19	41	2	
St Albans	1958-61	C1-4	118	37	36	14	62	19	10	51	11	Wilson 1984
St Albans	Folly Lane P3-7	C1-4	2201	603	209	285	73	20	7	24	11	Locker 1999
St Albans	All	Total	2319	640	245	299	72	20	8	72	11	
Silchester	Basilica	50-55	586	331	314	34	48	27	26	51	5	Crant 2000
		85-125/50	591	390	349	14	44	24	26	53	2	
		125-150	414	374	303	7	58	34	28	55	2	
		250-400	906	1479	805	21	38	46	25	65	2	
Silchester	Basilica	Total	2487	2574	1771	76	36	38	26	59	3	
Silchester	Insula IX	125-200	1148	858	965	20	39	29	32	47	2	Ingram 2011
		200-250	1574	947	625	19	50	30	20	60	1	
		300-500	1354	374	253	13	68	19	13	60	1	Ingram 2006
Silchester	Insula IX	Total	4376	3189	1848	37	50	27	23	54	1	
Silchester	North Gate	C3-4	225	79	85	16	58	20	22	48	7	Hamilton-Dyer 1997
Silchester	South Gate	50-85	273	109	32	1	66	26	8	77	0	Malby 1984
		85-130	201	91	70	6	56	25	19	57	3	
		300-400	164	73	91	6	50	22	28	45	4	
Silchester	South Gate	Total	638	273	192	13	38	23	17	39	2	
Silchester	Manor Farm	RB	109	66	38	2	51	31	18	63	2	Malby 1984
Silchester	All	Total	7545	5181	3930	159	45	31	24	57	2	
Winchester	Crowder Terrace	C2	266	36	6	72	86	12	2	86	21	Coy/Bradfield 2010
	Crowder Terrace	C3-4	20	80	8	7	19	74	7	31	26	
	Oram's Arbour	C1-3	40	80	43	74	23	51	25	67	65	
	Oram's Arbour	C3-4	116	105	31	46	46	42	12	77	28	
Winchester	Western Suburb	Total	442	309	49	159	53	37	10	78	31	
Winchester	Staple Gardens	C1-2	92	84	60	4	59	36	25	58	4	Malby 1985
		C3-4	523	373	222	34	47	33	20	63	6	
Winchester	Staple Gardens	Total	615	457	282	38	45	34	27	63	6	
Winchester	Victoria Rd G2	C1-2	989	73	32	103	90	7	3	70	9	Pfeiffer 2010
	Victoria Rd G4	C1-2	312	431	232	26	52	44	24	65	8	
	Victoria Rd East	C2-4	5035	3198	1151	448	54	54	12	74	8	
	Victoria Rd West	C2-4	878	864	400	105	41	40	19	68	11	Malby 2010
	Hyde Abbey	C2-4	602	776	284	82	36	47	17	73	12	
Winchester	Northern Suburb	Total	7816	5312	2099	761	51	35	14	72	8	
Winchester	Northgate House	C1-2	111	156	28	5	38	53	9	85	4	Strid 2011
		C3	385	274	144	8	48	34	18	66	2	
		C4	268	209	76	13	48	38	14	73	5	
Winchester	Northgate House	Total	764	639	250	26	46	39	15	72	3	
Winchester	JS Crown Hotel	C2-4	137	159	42	11	41	47	12	79	7	Malby 2010
	27 Jewry St	C2-4	171	123	45	11	50	36	13	73	6	
	Henly's Garage	C2-4	314	230	141	24	46	34	21	62	7	
Winchester	Defences	Total	822	512	228	46	48	38	17	69	7	
Winchester	All	Total	10259	7259	2917	1073	50	33	13	71	9	

Counts are of NISP or selected bone elements (refer to reports for details) and usually exclude sieved samples. Cow = cattle; S/G = sheep/goat; P = species present but not quantified by NISP; A = species represented by associated bone groups only; % Cow; % S/G; % Pig = percentages of total cow, sheep/goat and pig. S/P = percentage of sheep/goat of total sheep/goat and pig; H/C = percentage of horse of total horse and cattle.

Cattle

Beef production was of paramount importance in animal husbandry practices in Roman Britain. There is little doubt that beef was by far the most common meat consumed throughout the province, even allowing for biases against sheep and pig in faunal assemblages due to

taphonomic and recovery factors. The importance of beef in urban provisioning has long been established through general surveys of animal bone counts by King (1978; 1984; 1999). Cattle carcasses supply substantially more meat than those of pigs and sheep. So even if more sheep than cattle were kept in some areas of southern England, beef products may have provided over 90 per cent of the meat diet in some towns according to some estimates (e.g. Dobney *et al.* 1996).

The updated survey presented here shows that the average percentage of cattle of the total cattle, sheep/goat and pig assemblages (in 151 samples of >100 elements) was 51 per cent. In 68 cases, the percentage of cattle in the assemblages lies above 50 per cent and in 30 cases this figure rises over 70 per cent (Table 9.2). However, there is much variation in these results with cattle percentages ranging between 19 per cent and 100 per cent. There are many potential reasons for these variations, including chronological and regional variations, cultural preferences, butchery processes, and recovery and preservation biases. The following paragraphs will examine some of these factors.

Table 9.2: Percentages of cattle in early and late urban Romano-British assemblages (from sites in Table 9.1)

	10-19%	20-29%	30-39%	40-49%	50-59%	60-69%	70-79%	80-89%	90-100%	Total
50-100	1	4	7	5	2	2	3			24
50-200		4	7	4	4	2	2	1	2	26
100-200		1	4	2	1			4	2	14
100-300		2	6	2		1		2		13
150-400			2	4	3	1			1	11
200-300			4	1	2	1				8
200-400	1	1	4	5	3	3	1	3	2	23
300-450			1	5	8	2	2	2	1	21
Roman			1	5	1	2	2			11
Total	2	12	36	33	24	14	10	12	8	151

King (1984; 1999) showed that later Roman assemblages tended to produce higher percentages of cattle than in earlier phases. He argued that this showed increasing reliance on cattle in the agricultural economy. King's initial results and interpretations have generally been supported in later surveys (e.g. Grant 2004). Current research on a vast survey of Roman rural assemblages is also demonstrating that this trend is found consistently throughout the province (Allen forthcoming). The results from large towns are more complex. Maltby (2010, 265) showed that in Roman urban sites with multi-period assemblages, cattle percentages increased in the latest Roman phase in

17 cases but decreased in 11 other cases. Even within the same town there are sometimes contrasting trends. In Silchester, for example, as shown in [Table 9.1](#), cattle increased significantly in the Insula IX assemblages (from 39 to 68 per cent) but decreased on the Basilica site from 48 per cent to 28 per cent during the same period (Ingram 2006; 2011; Grant 2000). In some other assemblages, the percentages of cattle fluctuated both upwards and downwards, for example in the 1973–1991 assemblages from Southwark (Liddle *et al.* 2009). Nevertheless, there is a general tendency for percentages of cattle to increase in later Roman urban assemblages, as indicated in [Table 9.2](#), where the mode of cattle percentages increases from 30–39 per cent in samples dated between AD 50 and 200 to 50–59 per cent in assemblages of 4th-century date. These data are amalgamated in [Fig. 9.1](#) to compare assemblages of broadly early (AD 50–200) and late Roman (AD 300–450) date and these results confirm that cattle percentages tend to be higher in assemblages from the later period.

Although this supports the contention that beef production and consumption became increasingly important during the Romano-British period, it does not account for all of the variations observed. There are variations within different areas of the towns. Although there is a wide range of variability, assemblages from the centre of towns tend to produce fewer cattle bones than those from extra-mural sites. Percentages of cattle from intra-mural sites situated away from the central zones fluctuate widely but generally the percentages are higher than those from the central areas but lower than those from sites situated on or outside the defences ([Fig. 9.2](#)).

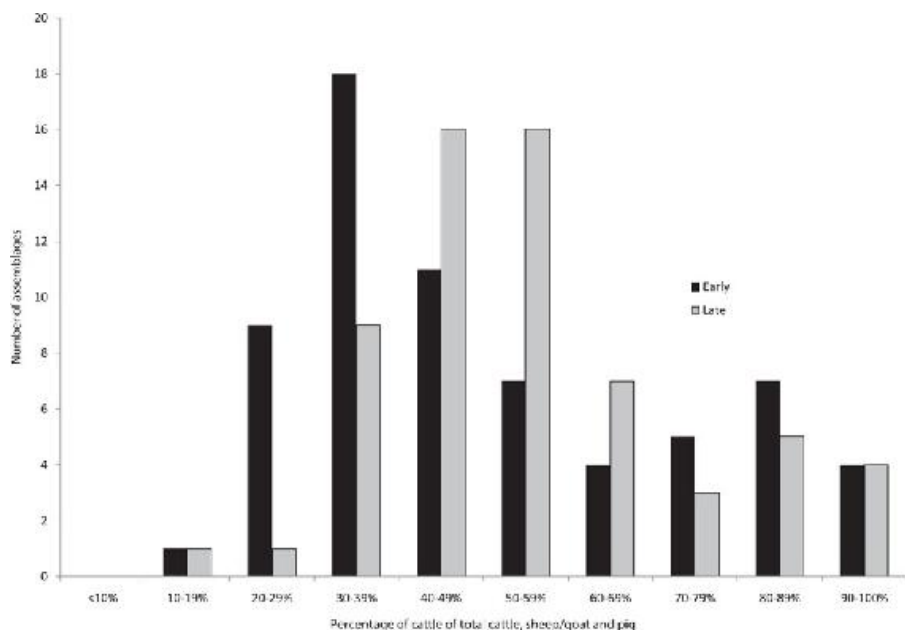


Fig. 9.1: Percentage of cattle of total cattle, sheep/goat and pig (over time).

Many of the assemblages with high percentages of cattle bones have evidence for the systematic disposal of butchery waste from specialist processing. Most of the Roman towns from southern England have produced evidence of these dumps. Sometimes these assemblages are dominated by heads and feet, such as the one from Rack Street in Exeter (Maltby 1979a). Other assemblages, most notably from Eastgate Street, Gloucester (Levine 1986) are dominated by split upper limb bones or by scapulae. These and other examples are listed in previous discussions (Maltby 2007; 2010, 286).

The specialist butchers developed very systematic and distinctive methods of carcase dismemberment, filleting and marrow extraction (Maltby 2007). It is clear that they handled a significant number of cattle brought to the towns for slaughter and processing. Although some of the cattle may have been reared close to the towns themselves, it is likely that they were obtained from a wide range of sources both from the local hinterland and probably from further afield. Recent strontium stable isotope studies have shown that some of the cattle from the rural settlement of Owslebury near Winchester were not raised locally (Minniti *et al.* 2014). Similar analyses on the cattle from the Roman towns themselves would be very interesting and may also show that cattle were obtained from different regions.

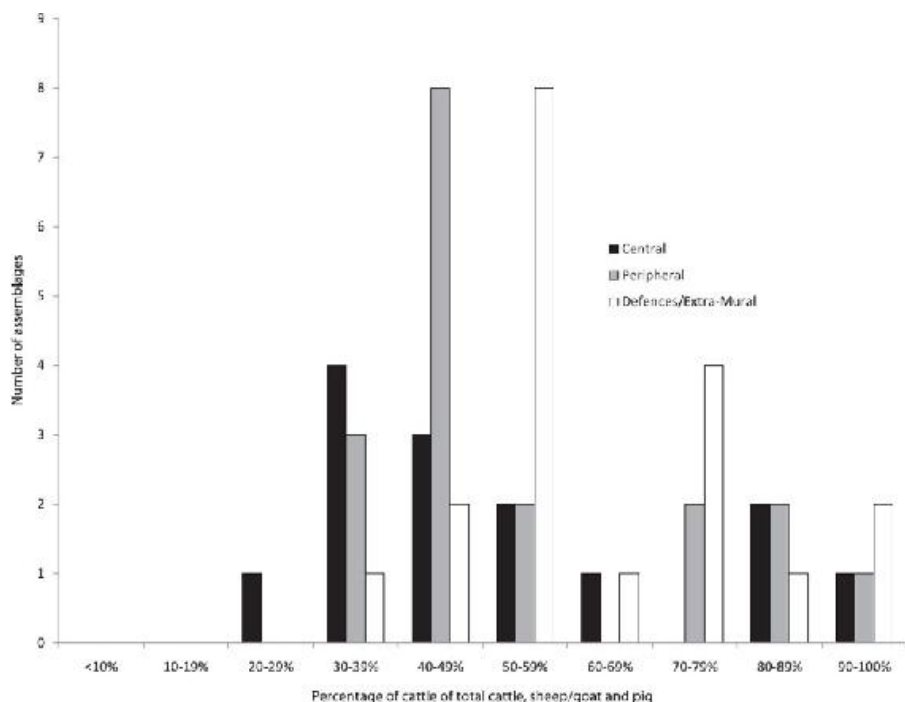


Fig. 9.2: Percentage of cattle of total cattle, sheep/goat and pig (over urban space).

The focus on provisioning towns with beef is also evident in the mortality profiles. The majority of cattle found on all types of site in Roman Britain are adults. However, many urban assemblages have quite distinct peaks of mortality that suggests that significant percentages of cattle were slaughtered between four and eight years of age, with a peak perhaps between five and seven years (Grant 2004; Maltby 2010, 288). Therefore, many of these animals were old enough to have produced calves, and to have provided dairy produce and/or have been used as beasts of burden prior to slaughter. Rural assemblages generally follow the same pattern but tend to produce less marked peaks of slaughter (Maltby 2010, 144). There are some exceptions to this general trend. For example, the assemblages from Insula IX at Silchester included an unusually large percentage of cattle killed between 2–3 years of age (Ingrem 2006, 345; 2011, 249). Another more common feature of some of the urban assemblages is the presence of calf bones. Calf mandibles, for example, form over 10 per cent of the assemblages from Greyhound Yard, Dorchester (Maltby 1994) and the Basilica site at Silchester (Grant 2000). This indicates that veal was consumed in significant quantities in at least some of the towns. Veal may well have been regarded as a luxury food. The

slaughter of calves can also be a by-product of dairy production.

Another consistent feature of cattle assemblages from Romano-British towns is the bias towards bones of female cattle based on evidence of measurements of the metacarpals. Metacarpals of cows are generally more gracile than those of bulls and oxen (Grigson 1982; Davis *et al.* 2012). Therefore, after the distal epiphyses have fused (by c. 36 months), measurements can indicate the sexes of adult cattle represented. Interpretations are complicated by the systematic breakage of metacarpals for marrow (results from complete bones are more reliable), regional and chronological variations in cattle sizes (Albarella *et al.* 2008) and by pathological changes that increase the distal breadth of some bones (Hammon 2011). Nonetheless, assemblages from Roman towns have been consistently biased towards smaller bones, suggesting that most of the adult cattle represented were females. These patterns have been observed in Exeter (Maltby 1979a, 33–34); Dorchester (Maltby 1993), Chichester (Levitan 1989); Cirencester (Maltby 1998); Colchester (Luff 1993), London (Pipe 2011), Southwark (Liddle *et al.* 2009) and Winchester (Maltby 2010, 148). The rural site at Owslebury, near Winchester, included a higher proportion of larger specimens, probably signifying the presence of more oxen on this farming settlement (Maltby 1994). More assemblages from rural sites in southern England still need to be analysed to see whether this pattern is repeated consistently. However, it would appear that the butchers in the towns targeted mature, mainly female, cattle that had become surplus to, or were considered unsuitable for, breeding and milk production.

There is convincing evidence that the Roman period saw an increase in the overall size of cattle, particularly in south-east England (Albarella *et al.* 2008). Some of these improvements may have been brought about by the importation of new stock. Larger cattle would have both increased the effectiveness of beef production and also for their strength for ploughing. The evidence for this increase in towns is somewhat masked by the bias towards smaller females, as discussed above. However, increases in size during the Roman period show up clearly in some samples from Southwark (Liddle *et al.* 2009) and Colchester (Albarella *et al.* 2008, 1835), for example. Evidence for size increases is much less marked in the south-west with cattle from Exeter and Dorchester being generally smaller than those from settlements such as Winchester (Maltby 2010, 292–3).

Table 9.3: Percentages of cattle from sites in different parts of towns (all

periods combined; data adapted from [Table 9.1](#) but excludes Southwark sites)

	10-19%	20-29%	30-39%	40-49%	50-59%	60-69%	70-79%	80-89%	90-100%	Total
Central		1	4	3	2	1		2	1	14
Peripheral			3	8	2		2	2	1	18
Extra-mural			1	2	8	1	4	1	2	19

Sheep and goats

The prevalence of sheep within sheep/goat assemblages on Romano-British sites including urban assemblages has long been established. Goats have been specifically identified in nearly all the towns surveyed but rarely provide more than 5 per cent of the diagnostic bones positively identified as sheep and goat (Maltby 2010, 268).

Sheep are the dominant species in most Iron Age assemblages in southern England (Hambleton 2008a) but tend to decrease in Romano-British assemblages (Albarella 2007). Although sheep percentages tend to be lower in urban sites compared to rural assemblages (King 1984; 1999), there are substantial variations both within and between towns ([Table 9.1](#)). As discussed above, some of these biases are due to the presence of large dumps of cattle-processing waste, which deflate the percentages of other species. Therefore, it is more informative to exclude cattle from the calculations and compare sheep and pig elements only. Sheep/goat elements outnumber pig in 101 of the 150 assemblages compared in [Table 9.1](#). In 31 cases sheep/goat provide over 70 per cent of the total sheep/goat and pig elements ([Table 9.4](#)). There are some chronological variations. Sheep/goat tend to be better represented in earlier assemblages from multi-period sites. On 35 multi-period sites there were decreases in the percentages of sheep/goat in the latest phase in 17 cases. However, sheep/goat percentages increased in later Roman phases in 10 other sites. The remaining eight sites either showed minimal chronological variations in sheep/goat percentages or percentages that fluctuated inconsistently. In some towns the trend is fairly consistent. In Dorchester, sheep/goat percentages decreased in later Roman assemblages in all five of the multi-period sites compared, although their percentages varied significantly between sites ([Table 9.1](#)). However, inconsistent chronological variations can also be found within other towns. For example, sheep/goat percentages increased in the Basilica and Insula IX assemblages in Silchester but decreased on the South Gate site.

Table 9.4: Percentages of sheep/goat of total sheep/goat and pig in early

	10–19%	20–29%	30–39%	40–49%	50–59%	60–69%	70–79%	80–89%	90–100%	Total
50–100		1	1	4	7	7	4			24
50–200		1	4	3	7	5	4	2	1	27
100–200			1	2	3	3	1	1		11
100–300			1	5	1	2	3			12
150–400			1	2	1	1	2			7
200–300		1	2	1	2	2				8
200–400	1	2	2	4	4	6	5	1	1	26
300–450		1	3	3	6	5	3			21
Roman		1	1	1	5	3	3			14
Total	1	7	16	25	36	34	25	4	2	150

Where minimum numbers of animals represented have been calculated, sheep/goat have sometimes been found to outnumber cattle. Examples include Insula IX, Silchester (Ingrem 2011, 263) and Winchester (Maltby 2010, 102). In some of the towns, it seems probable that sheep were the most commonly slaughtered species but, despite this, lamb and mutton provided a much smaller proportion of the meat diet than beef. There is much less evidence for significant dumps of processing waste of sheep in urban deposits than in the case of cattle. Although it is very likely that many sheep were acquired and processed by the specialist urban butchers, some may have been acquired and processed by individual households.

Although sheep/goat mandibular ageing evidence shows a lot of variations within and between towns, there are some common trends. Most urban assemblages have produced substantial percentages of mandibles from sheep slaughtered between six and 36 months of age. Often there is a marked peak of slaughter of animals aged between 18 and 36 months old, indicating a focus on meat production. There is, however, an increase in the percentage of older sheep in some later Roman urban assemblages (Grant 2004, 378), suggesting that wool production became an increasingly significant factor in sheep husbandry in southern Britain, although few very old animals are represented in urban assemblages (Maltby 2010, 290). Quite high percentages of bones of young lambs have been encountered on some sites, for example in several intra-mural assemblages from Colchester (Luff 1993, 73) and on the Basilica site in Silchester (Grant 2000).

As in the case of cattle, there is evidence for some improvements in the size of sheep during the Romano-British period, particularly in central and south-east England. Using log ratio analysis of a suite of measurements, Albarella *et al.* (2008) demonstrated that there were increases in sheep sizes during the Roman period at rural sites such as

Heybridge, Essex, as well as in the neighbouring town of Colchester. This trend can also be demonstrated by specific measurements, as indicated by distal tibia breadth measurements from Colchester (Figs 9.3–9.6 – data adapted from Luff (1993)). The bones from the late Roman deposits are generally larger than those from the earliest Roman phases. It should be noted that some large specimens appear even in the earliest period, which may indicate the importation of new stock. A similar observation was made in Winchester (Maltby 1994), where it has been argued that some of the larger stock may have been a hornless type. Larger sheep would have provided more meat and possibly more wool.

It should be noted, however, that size improvements in sheep were not found in all regions of Roman Britain. For example, there is little evidence that sheep in Exeter came from larger types (Fig. 9.7). Here, and in some other parts of western England and Wales, the sheep were no larger than those found on Iron Age sites in those regions (Maltby 2010, 294–5).

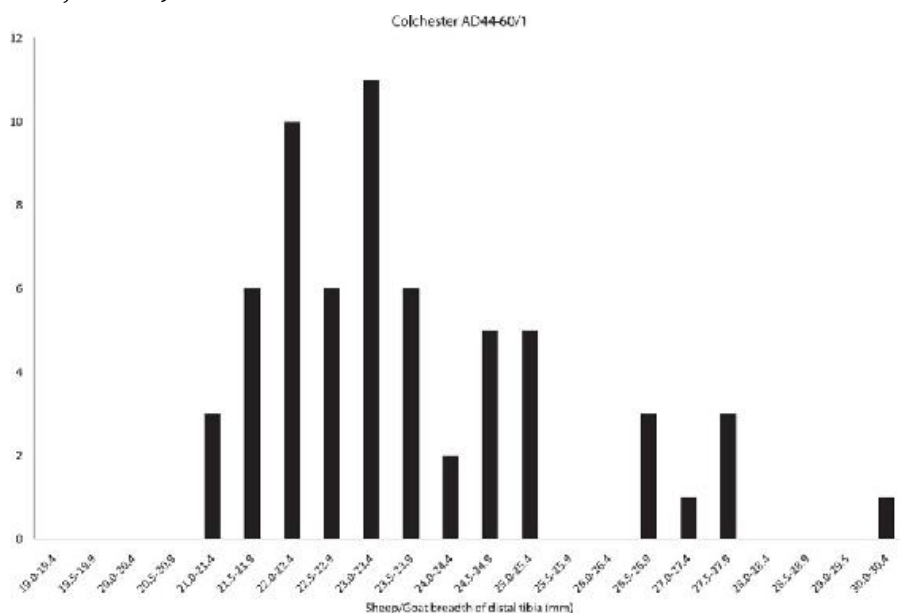


Fig. 9.3: Sheep/goat, distal tibia breadth measurements, Colchester AD 44–60/1.

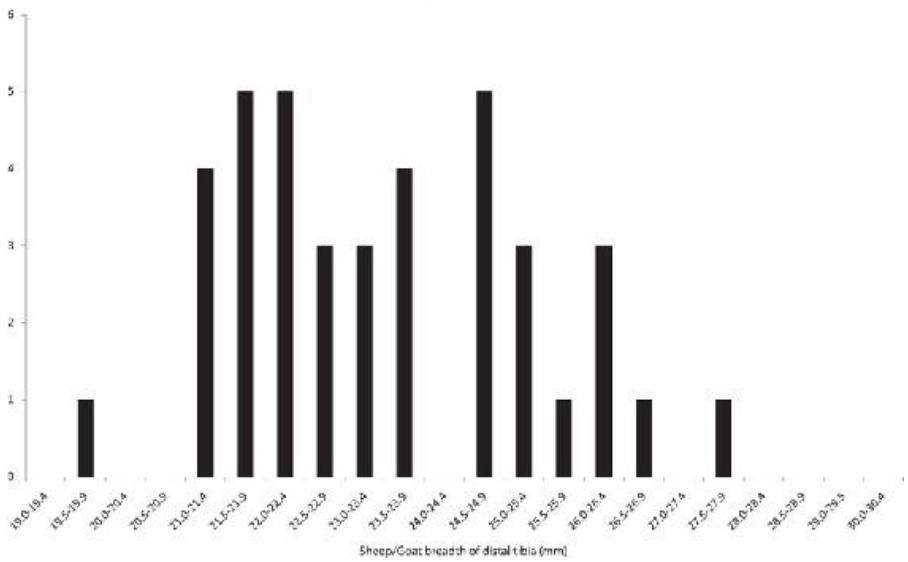


Fig. 9.4: Sheep/goat, distal tibia breadth measurements, Colchester AD 60–125.

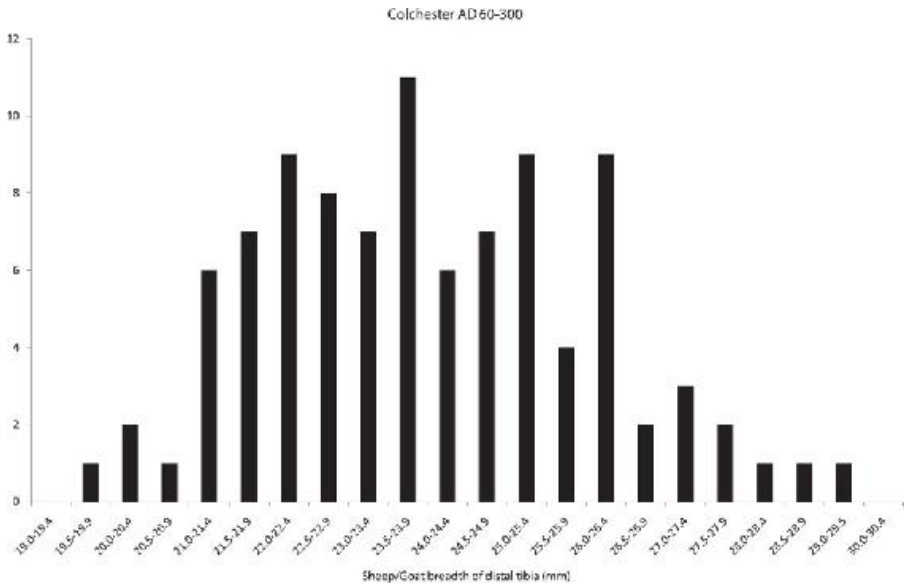


Fig. 9.5: Sheep/goat, distal tibia breadth measurements, Colchester AD 60–300.

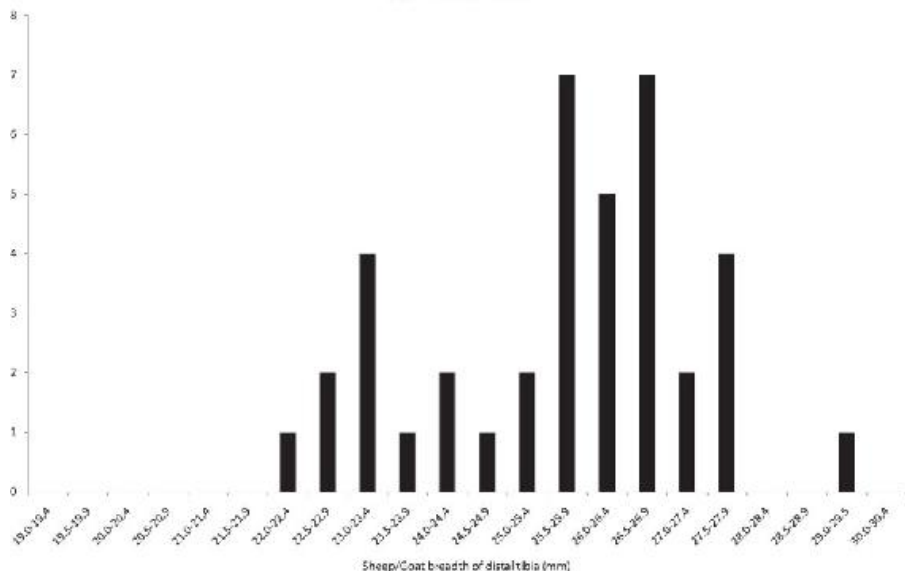


Fig. 9.6: Sheep/goat, distal tibia breadth measurements, Colchester AD 225-400.

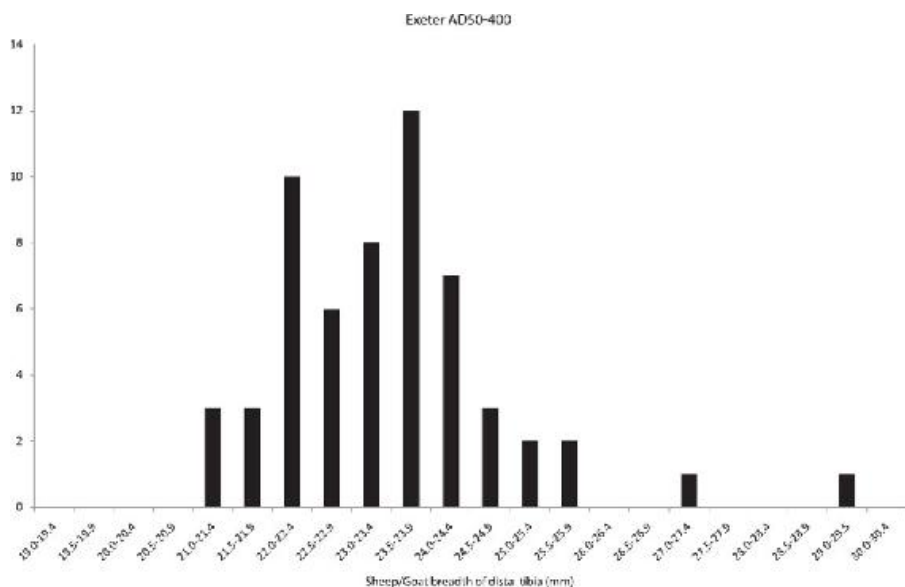


Fig. 9.7: Sheep/goat, distal tibia breadth measurements, Exeter AD 50-400.

Pigs

The relative abundance of sheep to pigs in the urban assemblages under consideration has been discussed above. King (1984; 1999) has shown that pigs tend to be better represented in large urban and military assemblages in Roman Britain. There is, however, a large

amount of variation. Pigs are particularly common on sites from London and Southwark, where they usually outnumber sheep/goat in the assemblages studied. They are also well represented on most sites in Colchester. They are much less well represented in some other towns such as Chichester and Winchester, particularly on sites not in the central areas of the towns (Table 9.1). King (1984) and Grant (2004) have both suggested that the increase in pork consumption may be linked to the cultural preferences of immigrant communities. The high percentages of pigs in the London region in the Roman period follows on from their occurrence in very high frequencies in assemblages from some proto-historic trading sites in the region, particularly Braughing (Ashdown and Evans 1981; Maltby 2006; Hambleton 2008a). Either the conditions for pig keeping were particularly favourable in this region, and/or the increase in pig rearing, along with significant local and long-distance trade in pork products, developed through interactions with Gallic and Roman communities during the late Iron Age and continued after the Roman occupation. Pigs would have been an attractive source of food for expanding urban communities, particularly if their inhabitants included immigrants with inherited preferences for pork dishes. Pigs tend to be well represented on high status sites, one notable urban example being the Winchester Palace site in Southwark (Reilly 2005), where pig provided 78 per cent of the total sheep/goat and pig elements (Table 9.1).

Pigs are also animals that can adapt to being kept within towns and pig slurry has been identified in Roman Leicester (Morris *et al.* 2011, 29). The skeletons of three very young piglets found near the centre of Roman Exeter (Maltby 1979a, 11) could well have belonged to ritual depositions but their presence also infers that pigs were farrowing within the town. Very young pig bones have also been recorded in Silchester and Dorchester. Pig bones were generally larger in Winchester and Dorchester than in neighbouring rural settlements and some of these could have been animals that had been raised and fattened in sties (Maltby 2010, 203). However, other explanations could also account for the size increase, for example, introduction of new stock, or the preferential selection of larger male animals for slaughter in towns. More mandibles from domestic boars than sows were found in deposits from Dorchester and in most of the assemblages from the Basilica and Insula IX sites in Silchester (Ingram 2011, 266).

As pigs are raised solely for meat, produce large litters and can tolerate a high rate of slaughter of immature animals, few pigs in archaeological assemblages from all periods belong to elderly animals. In most Roman urban assemblages in southern England, analysis of mandibular tooth ageing data has shown that the majority of pigs were slaughtered during their second and third years when they were approaching full size. Good examples of this culling pattern can be found in Southwark (Liddle *et al.* 2009, 247) and Winchester (Maltby 2010, 200). There is, however, again a lot of variability between assemblages both within and between towns. Bones of piglets under a year old have formed a significant component of some assemblages, particularly on sites near the centres of towns such as Dorchester and Silchester (Maltby 1993; Grant 2004, 379). The meat of suckling pigs, veal calves and young lambs may well have been regarded as luxury food items.

Butchery marks on pig bones from Winchester and Dorchester are quite consistent on vertebrae, mandibles and scapulae in particular (Maltby 2010, 188–94), suggesting that many pigs were processed by specialist butchers. Whether they acquired the pigs mainly from urban and other local sources or relied on a wider trading network remains to be established, although the likelihood that some joints of pork were imported to towns has been suggested by several authors on the basis of discrepancies in body part representation or evidence for large-scale processing on rural sites (*e.g.* Grant 2000; Ingrem 2011, 263; Maltby 2016).

Horses and other equids

It is usually assumed that all equid bones found on Romano-British sites belonged to horses, although there are now several positive identifications of mules and donkeys, mainly from London (*e.g.* Armitage and Chapman 1979; Bendrey 2002). Horses are generally poorly represented on urban sites. Horse provided 5 per cent or less of the total horse and cattle elements in 39 of the 151 assemblages listed in [Table 9.1](#). The highest percentages of horses usually occur on extra-mural sites, often in areas which were also used as cemeteries. Examples include the Western and Northern suburbs of Winchester (Coy and Bradfield 2010; Maltby 2010; Pfeiffer 2010), the Eastern Cemetery and Baltic House sites in London (Reilly 2000; 2002), Folly Lane, St Albans (Locker 1999) and Butt Road, Colchester (Luff 1993). This suggests that horse carcasses were often deposited in those burial

areas, although not necessarily given formal burial themselves. Horses have generally been found in greater abundance on Roman rural settlements (Maltby 2016). Although horse bones occasionally bear evidence of skinning and, even more rarely, butchery, they were not eaten frequently in towns or elsewhere. Hence their rarity in assemblages derived mainly from food processing and consumption debris is to be expected. It is possible that some of the population may have had a taboo on eating horseflesh.

On all types of settlement, most horse bones represented in the assemblages belonged to adult animals – a further indication that they were not regarded primarily as meat producers. Their value to the agricultural economy lay elsewhere. They were mainly exploited as beasts of burden. Abnormal wear has been observed on a number of premolars resulting from the frequent use of a bit during riding and horses, mules and donkeys would also have been used to pull carts. Horses were, however, not used as plough animals until the medieval period.

There is also evidence that some Roman horses were larger than those found on Iron Age sites (Albarella *et al.* 2008, 1841), although the majority found on civilian sites were no larger than modern New Forest ponies.

Poultry

Although chickens (domestic fowl) were introduced to Britain sometime after 500 BC, they are absent from most Iron Age sites in southern England. Where they have been found, it is usually only in very small numbers and mainly in assemblages dating to the 1st century BC or 1st century AD (Hambleton 2008a; Poole 2010). They may have been originally introduced for purposes other than food (Sykes 2012). There is also the enigmatic, unsubstantiated, but often quoted, statement from Julius Caesar's *Gallic War* (5, 12) which stated that, although the Britons (in the middle of the 1st century BC) kept chickens, they did not eat them. Butchered bones, however, have been observed on some late Iron Age sites, including Braughing (20 BC–AD 20), where they were found in substantially greater numbers than on other Iron Age sites (Ashdown 1981; Maltby 1997), again indicating continental influence at that trading settlement. However, here and elsewhere, chickens also continue to be frequently deposited as complete or partial skeletons or accompanying human burials (Sykes 2012).

Chickens were the only types of poultry commonly exploited in Roman Britain. They usually form over 50 per cent of the identified bird bones on major urban sites (Maltby 2010, 272–7). Their flesh was eaten in the Roman period, as indicated by the presence of butchered bones, but their frequency on different types of site is variable. Maltby (1997) demonstrated that chicken bones occurred more frequently on urban and military sites than on rural settlements, suggesting that this reflected variation in the dietary and cultural preferences of their inhabitants. This pattern has been confirmed by more recent work on a much wider range of assemblages from rural (Allen forthcoming) and urban sites (Maltby 2010, 272–6). In 39 assemblages from urban sites in southern England surveyed in the latter study, chickens provided between 0 per cent and 69 per cent of the sheep/goat, pig and chicken bones (Maltby 2010, 276), with a mean of 12.3 per cent. These results excluded bones from sieved samples, in which percentages of chickens have usually been found to be higher.

Additional to the sites reviewed in Maltby (2010), chickens provided 21 per cent of the sheep/goat, pig and domestic fowl sample from the Dorchester Hospital site. This is substantially higher than encountered in the large assemblage from the Greyhound Yard site (12 per cent) in the same town (Maltby 1993). However, many of the chicken bones from the Hospital site were associated with one early, probably high status, Roman building (Grimm 2008). Similar substantial variations in chicken abundance between sites have been observed in other towns. Chickens provided 11 per cent of the sheep/goat, pig and domestic fowl assemblage from sites excavated between 1973 and 1991 in Southwark (Liddle *et al.* 2009, 245). This percentage lies between percentages of chickens that have been calculated in assemblages from other Southwark sites, which range between 6 per cent and 26 per cent (Maltby 2010, 276). In recent reports on sites from *Londinium* itself, chickens provided 10 per cent of the total sheep/goat, pig and chicken bones from the Amphitheatre (Guildhall Yard) site (Liddle 2008) and 8 per cent from the 1, Poultry site (Pipe 2011), ironically one of the lowest percentages obtained from London sites.

Indeed, the highest percentage of chicken bones from sites in this survey (69 per cent) has been obtained from the London mithraeum (Macready and Siddell 1998), probably reflecting that ritual depositions of chickens were frequently made at this site. Cockerels in particular seem to have been associated with the cult of Mithras and

large deposits of chicken bones have been found, for example, at the mithraeum at Tienen in Belgium (Lectacker *et al.* 2004). Chickens generally tend to be well represented on temple sites in Roman Britain (King 2005). The best-known example comes from Uley, Gloucestershire (Levitan 1993) where large numbers of chickens and goats were found at shrines dedicated to Mercury. These may have been from flocks specifically raised for sacrifice. Chickens also quite frequently continue to accompany human burials, for example in the Eastern Cemetery in London (Reilly 2000), Poundbury, Dorchester (Farwell and Molleson 1993) and Lankhills, Winchester (Strid and Worley 2010, 430). Chickens were probably highly regarded as exotic birds and hence would have served at this time both as a luxury food item and as an animal that fulfilled other roles in ritual and sport.

Medullary bone is deposited within the shafts of bird bones (particularly the femur and tibiotarsus). It is a source of calcium for eggshell formation and its presence is therefore indicative of females in lay. Medullary bone has been recorded in chicken bones from several Romano-British sites, including Silchester, Winchester and Dorchester, indicating that the hens in question were in lay or had recently been in lay before they died (Maltby 2010). Unhatched eggshells from Dorchester and London indicate that chicken eggs as well as chicken meat were eaten (Sidell 2008). The presence of very young chickens in most Roman urban assemblages attests to the keeping of chickens in these towns, although it would be surprising if urban populations relied on urban supplies for all their chicken supplies. Nevertheless, chicken husbandry may not have been as widely practised in the countryside compared with longer established and more economically important domestic species, particularly sheep and cattle.

As with other domestic species, there is some evidence for an increase in stature of chickens on some sites in south-east England during the Roman period (Albarella *et al.* 2008, 1842).

Whether many domestic ducks and geese were kept in Roman Britain is less clear (Albarella 2005). Bones of grey lag/domestic goose and mallard/domestic duck have been found in most Romano-British towns but usually only in small numbers. Ducks are usually better represented than geese in the assemblages surveyed by Maltby (2010, 273). The discovery of a hatched goose egg from Dorchester suggests that domestic geese were kept there (Sidell 2008).

Future research directions

The above discussion has briefly summarised the evidence for relative species abundance, butchery and other processing practices, the use of secondary products (milk, eggs etc.) and the culling patterns of domestic animals consumed in towns. It has shown that there are substantial variations within and between towns and between different regions. However, there are some consistent trends in husbandry and consumption practices that have been found in many of the towns. The focus was on beef production, supplemented by pork, lamb and mutton plus a relatively small contribution from chickens. Horses were only rarely included in the meat diet. There were variations in diet between towns and between different communities within the towns and their suburbs. Some of these variations were the result of cultural preferences; others were linked to increased productivity; many were the result of large-scale disposal of cattle-processing waste. Most cattle were processed by specialist butchers who processed the carcasses intensively and quickly, including preserving some of the meat through smoking and salting. They also collected and processed large quantities of marrow from cattle limb bones. The presence of neonatal animals of all domestic species, but particularly pigs and chickens, shows that some animals were raised in towns and in their local hinterland. Undoubtedly, however, towns would have made major demands upon rural production from further afield for their supplies. The acquisition of substantial numbers of animals for the urban market would have had a major and detrimental effect on traditional redistribution practices.

This discussion has focused on towns because, to date, these have formed the largest assemblages and because many developer-funded sites have produced material over the last 30 years (Maltby 2015). Evidence from towns can, of course, provide only a partial picture of the pastoral economy in southern England during the Roman period. Towns were major consumer sites and, as has been shown, are likely to have focused on specific targets of animals to be acquired for their provision. To get the full picture, comparisons need to be made between urban and rural sites in their hinterland. Unfortunately, in the past this has not been possible to any great extent. Sometimes this is the result of poor preservation and retrieval. Acidic soils in the hinterland of Exeter, for example, have prevented the survival of bones from farms in its vicinity. There have, until quite recently, been only limited excavations of villas that have acquired good faunal assemblages. Fishbourne has produced a very good bone sample

(Grant 1971; Allen and Sykes 2011) but Fishbourne was an exceptionally opulent palace and its inhabitants and their consumption practices are not likely to be typical of inhabitants of later smaller villa estates. Many non-villa rural settlements have produced very small bone assemblages, which are too small to compare on an individual basis with urban samples. However, the Leverhulme Rural Settlement of Roman Britain Project is currently accumulating faunal and other data from thousands of sites, which will form the basis of a more general review (Allen forthcoming). This will provide an excellent opportunity to compare urban assemblages with all types of rural sites from small farmsteads to small towns. It will also advance inter-regional comparisons, which have not as yet been fully considered.

Any considerations of animal husbandry also need to take into account their contribution to the arable sector of the economy. For example, the relatively high percentage of bones of large male cattle found on rural sites such as Owslebury is undoubtedly linked to the employment of cattle for ploughing. These cattle therefore made significant contributions to grain production. The manure of domestic stock would also have enhanced soil fertility.

Finally, there is now a suite of new scientific techniques that can be used to supplement and enhance traditional zooarchaeological studies. To consider a few of these techniques, the expansion of stable isotopic studies on animal remains has the potential to provide us with a much more detailed understanding of the movement of animals in Roman Britain and the sources of urban food supply (Minniti *et al.* 2014). Carbon and nitrogen isotopes can also be used to study subtle variations in the diets of the animals themselves, which can also provide information about where the animals were feeding and whether they were receiving supplementary foods. There has been surprisingly little analysis of lipid residues in Roman pottery, which has proved so enlightening for previous periods in detecting residues of dairy produce and animal fats (e.g. Copley *et al.* 2005). Genetic (aDNA) studies in combination with metrical analyses would also advance our understanding of breeding patterns and importations of new stock, and how widely new types of stock spread across the province.

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Chapter 10

The Roman Salt Industry in South-Eastern Britain

Edward Biddulph

Introduction

The Roman geographer Strabo famously listed grain, cattle, gold, silver, iron, hides, slaves and dogs as among the commodities produced in Britain (*Geography* 4, 5, 2). He could have added salt. During the late 1st century BC, the time he was writing, there were extensive salt-workings in the Thames Estuary and along the coasts of Essex, Kent, Sussex, Hampshire and Dorset. Tacitus (*Annals*, 13, 57) mentions the extraction of sea salt by evaporation in Germany, but he also is silent on salt production in Iron Age and Roman Britain. So too, for much of the later 19th and 20th centuries, was archaeology.

Until recently, the study of the salt industry in southern Roman Britain has been dominated, perhaps even inhibited, by the study of red hills, the distinctive mounds of red earth dotted around the southern coast, chiefly in Essex, and briquetage, crudely-made ceramic vessels and objects found chiefly at coastal sites, but also inland. The earliest antiquarian investigations of red hills and briquetage in the late 19th century and early 20th century generated much interest, but little consensus about their function. Certainly salt production was put forward as the explanation by some, among them H. Wilmer (1909), who noted the similarities between the structures and briquetage vessels uncovered in Brittany and those in Essex, and Reverend J. C. Atkinson, who saw parallels with medieval salt works in Yorkshire (Fawn *et al.* 1990, 2), but others were not convinced. Sir Flinders Petrie favoured soap and glass production (*ibid.*), while Francis Reader, on behalf of the Red Hills Exploration Committee, a body set up by the Essex Archaeological Society and the Essex Field Club, stated after excavating a number of red hills that the evidence did not warrant any definite conclusions about how the red hills formed, or any satisfactory explanation of the purpose of the briquetage they contained (Reader 1909, 179). Salt production nevertheless remained the front-runner, but it was not until systematic fieldwork was carried out by the Colchester Archaeological Group and other local groups between the 1950s and 1970s – which led to the organisation of an

international conference on ancient salt production (De Brisay and Evans 1975) and the publication of the seminal *The Red Hills of Essex* (Fawn *et al.* 1990) – that the evidence linking red hills with salt production was deemed conclusive.

As in Essex, the earliest investigations of salt-making sites in Kent failed to recognise much of the evidence of that industry. For example, coarse pottery that varied ‘from light brown to pale brick shade’ – probably briquetage – was recovered from Dumpton Gap, Broadstairs (Hurd 1909, 432), but no connection with salt production was made. More exceptionally, excavation of a site in Cooling in 1929 uncovered a mound of loose soil containing burnt material and briquetage, which, by analogy with Essex red hills, was thought to relate to salt production (Druce 1930). There was, however, little subsequent publication of fieldwork on salt-production sites until the 1960s, by which time discoveries in Essex and elsewhere, such as Dorset and Yorkshire, allowed archaeologists (e.g. Miles 1965, 263; Ocock 1969, 257) to be more confident of a salt-related explanation. In Sussex, Roman-period salt-making evidence was either ignored or unrecognised until, it seems, Richard Bradley conducted surveys of the intertidal zones of Chidham, near Chichester (Bradley 1975). An appeal in 1867 for information ‘respecting salt-works in Sussex’ did not, judging by the pages of *Sussex Archaeological Collections*, bring a response. As Holden and Hudson (1981, 117) wryly noted in their review of salt-making in the Adur valley, ‘the study of saltworks in general in Sussex might have had an earlier beginning.’

While it is now routinely acknowledged that the coastal salt industry played an important role in the Roman-period (and earlier) economy, and consequently has attracted serious academic study and synthesis (De Brisay and Evans 1975; Fawn *et al.* 1990; Rippon 2000; Kinory 2012; Hatherway 2013), the study of the industry still has much ground to gain. There have been, for example, few scientific analyses of red hills or similar saltern debris, and remarkably just a handful of scientific dates have been obtained. Many questions remain partially or wholly unanswered, among them questions about the means of salt production (its *chaîne opératoire*), the formation and composition of saltern debris, chronology, seasonality, distribution, levels of production, the character of associated settlement evidence, related activities, and the organisation and ownership of salt works. Concentrating on the evidence from Kent and Sussex, though inevitably touching on the material from Essex and Hampshire, this

chapter will review the evidence of coastal salt production around south-eastern Britain and address some of the still poorly understood aspects of this Cinderella industry.

The salt industry in Kent

Roman salt production is attested in north-west Kent, the Hoo Peninsula, the Medway estuary, the Isle of Sheppey, north-east Kent, the Isle of Thanet, the east coast of Kent, and Romney Marsh (Fig. 10.1; see also Hathaway 2013, and Booth, this volume). Evidence for salt-working in north-west Kent is largely confined to briquetage. Plates, vessels and supports have been recovered from various sites in Dartford, as well as further inland, for example at Horton Kirby (Priestley-Bell and Barber 2004, 91; Poole 2011a, 139; 2011b, 232; 2011c, 265). The material points to the nearby presence of hearths or ovens, although given the location of the sites on elevated ground away from the inter-tidal zones of the Thames it may instead relate to secondary stages of salt-production – refining, drying and distribution, rather than primary evaporation (Morris 2001; Poole 2011a, 139). The Roman town of Springhead, near Gravesend and excavated by Oxford Wessex Archaeology ahead of construction of High Speed 1, may similarly have seen secondary processing. Briquetage troughs or bowls and pedestals were recovered from the site (Poole 2011d, 323), but it seems unlikely that primary evaporation was carried out locally, as the environment of the Ebbsfleet river by the settlement produced no evidence of salt marsh. Some continuity of tradition is suggested here. Evidence of *in-situ* hearths and water management features, such as tanks and channels, were absent in the early to middle Iron Age settlement at the nearby sites of Site C East and Tollgate, though briquetage vessels, pedestals and hearth debris were present. This may represent the deposition of waste from a nearby production site, or again point to the importation of semi-processed salt for secondary processing (Morris 2012, 244). Just a small quantity of briquetage containers were recovered from Northfleet villa, which was built closer to the Thames on the Ebbsfleet river where salt marsh was well established (Barnett and Stafford 2011, 234–5). Any salt that arrived there seems to have been ready for consumption (Poole 2011d, 343). Salt production is suspected, however, at Chalk, east of Gravesend. A layer of reddish clay associated with Roman pottery was identified by Detsicas (1970, 185) as a possible red hill-type of deposit.

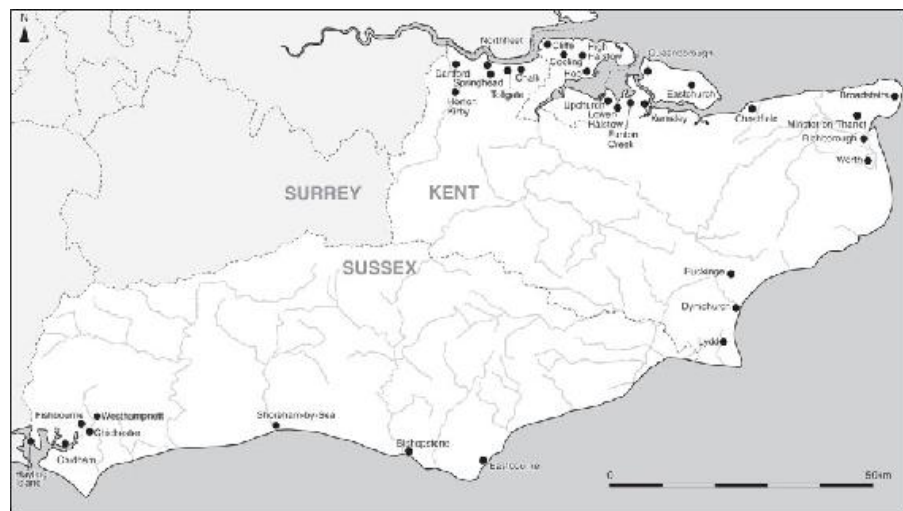


Fig. 10.1: Map showing salt-related sites in Kent and Sussex (drawn by Magdalena Wachnik).

Several salt-working sites are known on the Hoo Peninsula. At Cliffe, the remains of features described as salt pans (pond-like depressions in the ground) and a mound were recorded at a site at Bush Wick (Thornhill and Payne 1980, 380). A Roman date seems unlikely on the basis of medieval pottery collected with Roman pottery from the mound, but hearths cut into the alluvial clay at Cliffe Creek were tentatively assigned to the Iron Age or 1st century AD on the basis of briquetage found in a layer sealing the structures (Miles 1968, 272–3). Further quantities of briquetage have been exposed periodically with the erosion of the mouth of the creek (e.g. Day 1975, 208), and briquetage associated with late Iron Age and early Roman pottery has been collected from the peat deposits of John's Hope marshland (Hutchings 1987, 376). More substantial remains of salt production are known at Cooling. Excavations by the Medway Archaeological Group at Broomhey Farm uncovered evidence that spanned the 1st to 3rd centuries AD (Fig. 10.2). A group of features comprising a double hearth structure (51), an array of four settling tanks (52–5) and buildings defined by gullies and floors of crushed briquetage was dated by pottery to the 1st century (Miles 2004, 309–11). This activity appears to have been broadly contemporary with a mound of burnt material – identified as the burnt remains of rush (*Juncus*), a salt marsh plant – and briquetage uncovered during earlier excavations (Druce 1930, xlvi). That salt making continued at the site into the 3rd century is suggested by a flanged bowl recovered from a rectangular settling tank, which was associated with other

tanks, hearths, and traces of a building (Miles 2004, 315). The area of salt making appears to have been extensive. A series of test pits dug some 50m east of the main excavation area cut through layers of briquetage and charcoal dated to the 1st century AD (*ibid.* 318). At High Halstow, south of Cooling, depressions or 'saucer-shaped pans' dug into the clay were presented as evidence for salt production (Thornhill and Payne 1980, 382). Excavations at Decoy Farm, High Halstow, uncovered deposits of fragmented briquetage – including evaporation vessels, containers and wedges – and a quantity of 'saltern debris' (Ocock 1969, 257). Fragments of samian and colour-coated wares collected from similar deposits uncovered during subsequent excavation date production at the site to between the late 1st to 3rd centuries (Monaghan 1983, 279). More saltern debris – its precise composition is unknown – was collected along with Roman-period pottery at Hoo on the south-eastern edge of the Hoo peninsula (Ocock 1965, 273).

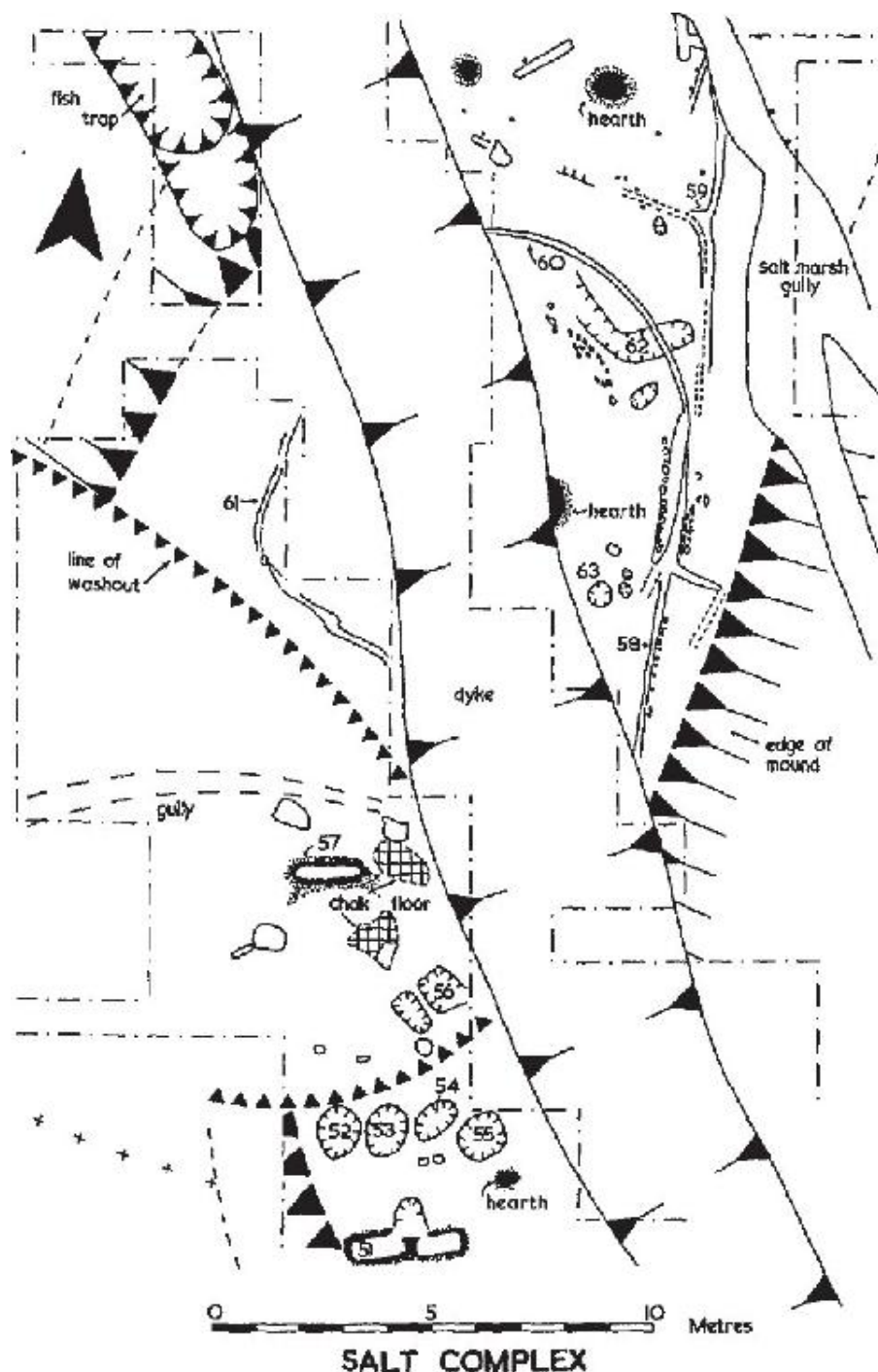


Fig. 10.2: Plan of salt-production features at Broomhey Farm, Kent (Miles 2004; courtesy of the Kent Archaeological Society).

Salters also established salt-working sites in the Medway estuary. Excavation by Alec Detsicas at a site at Funton Creek in the Lower

Halstow marshes uncovered a thick layer of black ash (Detsicas 1984, 165), at least three 'salt pans' cut into the clay, areas of burnt clay, and an array of three tanks, plus a fourth out of alignment. No briquetage containers were found, and Detsicas (1984, 167) considered that the tanks had been filled with brine and surrounded by wood fuel to permit evaporation. Pottery recovered from the site dated to the 3rd century (*ibid.* 168). Briquetage firebars and pedestals from the Upchurch marshes were noted by Reader, who also identified extensive areas of red earth (Reader 1909, 178–9). Briquetage containers and hearth furniture were recorded at Funton Marsh. A spread of saltern debris, including briquetage evaporation vessels and firebars, was recorded close to a hearth, which contained layers of ash and traces of lead (Miles 1965, 261). Pottery and a coin pointed to a 2nd-century date (*ibid.* 265).

Briquetage was recovered from pits and gullies during excavations along the Isle of Sheppey on the A249 between Queenborough and Iwade (Canterbury Archaeological Trust 2005), and briquetage has also been collected from Eastchurch (Kelly 1967, 291–2). The *in-situ* remains of a salt-working site were discovered during excavations by Archaeology South East at Kemsley along the Sittingbourne Relief Road on the south bank of the Swale channel, which separates Sheppey from the mainland of Kent. The salt-working was assigned to the late 1st–2nd century, although at least two phases of activity were detected. The earliest phase comprised a group of four shallow bowl-shaped cuts in the natural alluvial clay on the edge of a larger pit, which was filled with a charcoal-rich silt and a few burnt stones. The surfaces of the shallow cuts were recorded as being 'salt-affected' and the features interpreted as salt pans used for the evaporation of brine (Dawkes 2013, 14). In the second phase, a hearth constructed with three vertical clay walls to form two cells was inserted into the salt pans. A layer of charcoal was found at the base of the hearth (*ibid.*). As at Funton Creek, briquetage containers were almost entirely absent, though wedges, pedestals and structural briquetage and ceramic building material were collected (Clifford 2013, 35).

North-east Kent saw significant coastal exploitation in the medieval period, giving rise to a thriving salt industry (Allen 2004, 123–4). Evidence for Roman salt production, however, is limited. Excavations by Pre-Construct Archaeology at a site dating to the late 1st century at Chestfield on the north-east coast of Kent uncovered a number of pits which contained fragments of thin-walled briquetage vessels. Kiln

furniture also recovered pointed to local pottery production, raising the possibility that the briquetage had been gathered from a nearby salt-making site to provide a useful source of grog temper (Wooldridge *et al.* 2008). Briquetage has been found at a number of sites on the Isle of Thanet, among them the villa at Minster-in-Thamet, Dumpton Gap in Broadstairs (Hurd 1909, 432), and along the East Kent Access Road (Poole 2015), but salt-making sites have proved elusive.

Despite a reference in the Domesday Book to salt works along the Wantsum channel, there is little evidence for Roman-period salt production in that area. A large quantity of what was described by the excavator as burnt earth sitting above the natural brickearth was recorded outside the north wall of the Roman fort at Richborough (Dowker 1889, 12), but no briquetage-type material was noted and the deposit was interpreted as the site of a granary destroyed by fire. Durham and Goormachtigh (2012, 328) suggest that *Rutupiae*, the Roman name for Richborough, means ‘Red Hill’, referring to mounds of red earth from salt making that the Romans are considered to have observed when they landed on the coast. The suggestion is in contrast to that discussed by Rivet and Smith (1979, 449–50), who pursue a derivation on the lines of ‘muddy waters’, although they come to no firm conclusion. This is not the place to consider the complex etymological arguments on either side, but needless to say, the issue of derivation is yet to be settled, and Richborough’s Roman salt works are still to be found. At Dickson’s Corner, Worth, further south on the east coast, a spread of black clay and sand containing abundant charcoal and burnt red clay represents a dump of fuel waste and hearth material (Parfitt 2000, 117). No briquetage was recovered from the deposit, but the 400-odd sherds of pottery collected from it mainly comprised refired fragments of bowls, dishes, jars, flagons, and a jar perforated through the base to form a strainer. Malcolm Lyne (2000, 132) considers that the perforated vessel was used to strain wet salt, which was then placed in bowls and dishes and dried above the hearths. The vessel’s association with what might otherwise be regarded as standard domestic pottery makes it difficult to attribute the vessel to salt production with confidence, but it remains possible that strainers such as this were used in the industry.

Roman salt-making evidence on Romney Marsh has been inferred from briquetage finds from several sites, including Dymchurch and Ruckinge; pottery of 1st and 2nd-century date was also recovered from the latter site (Cunliffe 1988, 85). More substantial evidence of

salt production, dated to the early Roman period, was uncovered in the southern tip of Romney Marsh at Scotney Court, Lydd, during excavations in 1990 by Archaeology South East. The investigation revealed an extensive layer of dark grey silt clay, abundant briquetage fragments, and a number of features, including oval pits, narrow gullies, and a shallow scoop cut into a shingle deposit, from some of which briquetage was recovered. A thick layer of dark brown silt clay containing flint pebbles, briquetage and charcoal flecks sealed the pits (Barber 1998, 331–5). At least one pit was interpreted as a potential salt pan or settling tank (*ibid.* 350). Splayed-sided and square or rectangular vessels, pedestals, props and wedges were among the briquetage forms encountered (*ibid.* 341).

The salt industry in Sussex and Hampshire

Evidence for Roman salt production in Sussex is known in Chichester Harbour, at the mouths of the rivers Ouse and Adur rivers, and at the east end of the South Downs (Fig. 10.1). Salt processing, possibly drying or refining, is suspected on a hillside above the Eastbourne levels. Fragments of what was described by Sir John Evans as burnt clay cylinders may be identified as briquetage objects, possibly pedestals (Bradley 1971, 23). Briquetage was recovered from excavations at a similarly elevated location, Rookery Hill in Bishopstone. Cylinder-shaped vessels, tray-like vessels, pedestals, wedges, bars and bricks were recorded. Two pits – one elongated, the other circular – and a ditch were among the features uncovered, but none was identified as a hearth (Bell 1977, 119). A site at Ropetackle, Shoreham-by-Sea, comprised a number of pits and ditches, which contained small quantities of briquetage (Stevens 2011, 63).

Features more certainly connected with salt production were recorded during excavations at Chidham in Chichester Harbour. In one area (site A), an extensive layer, 150mm thick, overlaying alluvium, and composed of briquetage and pottery, extended around an irregularly-shaped pit, which also contained briquetage (Bradley 1992, 29). More features were uncovered in a second area (site B) close by (Fig. 10.3). There was a ditch terminal (F2) filled with alternating layers of alluvium and black mud and, in the upper fills, briquetage and burnt flint. Next to this there was a shallow, clay-lined, rectangular pit (F3). A linear feature (F1) to the north comprised several elements, including a round-bottomed cutting filled with burnt clay from which a clay-lined trench filled with alternate

layers of burnt and unburnt clay appeared to emanate (Bradley 1992, 35). Briquetage vessels were collected from both areas, but there was a difference in the distribution of types; thin-walled vessels were more strongly associated with site A, while the vessels from site B tended to be thicker walled and larger (*ibid.* 36–9). Bradley (1992, 38) saw the ditch terminal in site B as a reservoir for seawater, the rectangular pit as a settling tank, and the trench/rounded cut as a flue and evaporation hearth. Pottery recovered from the sites included bead-rimmed and bucket-shaped jars of 1st- and early 2nd-century date (*ibid.* 39).

Chidham sits on the border of West Sussex and Hampshire, but it represents one of a number of salt-making sites known in the natural harbours and salt marshes of the Solent. Langstone Harbour in Hampshire, for example, saw a medieval salt industry, but Roman production is suspected based on briquetage finds (Allen *et al.* 2000, 83). On the Isle of Wight, salt-production evidence of briquetage and hearths is known around the coast, including at Fishbourne to the north, Redcliff to the east, and Barnes Chine and Grange Chine to the south (Tomalin 1990; Lyne 2006). Alas, the claim attributed to St Augustine of Hippo, who lived during the late 4th and early 5th century, that the salt made around the shores of Hayling Island was ‘superior to every other salt made on the British coast’ (*cf.* Allen *et al.* 2000, 83) appears to be apocryphal.

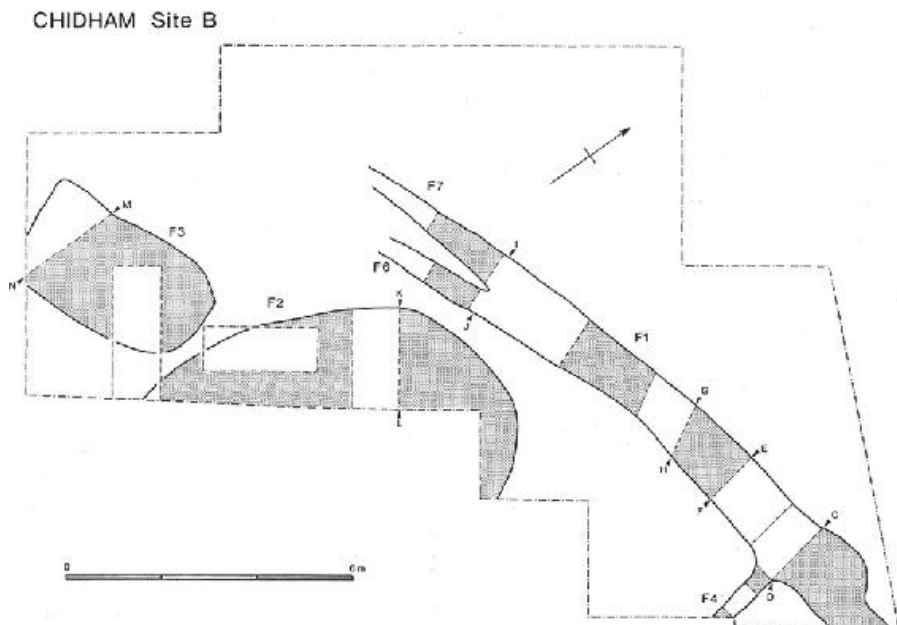


Fig. 10.3: Plan of salt-production features at Chidham, Sussex (Bradley

The salt industry in Essex

Red hills, the remains of low mounds of red earth characteristic of salt making in Iron Age and Roman Essex, have been found along the entire coast of the county, enjoying a distribution stretching from close to Harwich Harbour in north-west Essex (Barford 2002) to Mucking Creek and East Tilbury deep in the Thames Estuary (e.g. Biddulph *et al.* 2012), although there were areas of particular concentration (Fig. 10.4). The Hullbridge survey, an investigation of the archaeology of the Essex coast undertaken in the 1980s, uncovered some 140 red hill sites in the Blackwater estuary and around Mersea Island, 25 sites in the Dengie Peninsula, and around 20 sites in the Crouch estuary (Wilkinson and Murphy 1995, 168–9). The deposits of red earth were typically between 0.1m and 0.7m thick – some survived to 2m in height into modern times, only to be denuded by the plough – and were generally composed of dark red-brown brickearth with inclusions of charcoal and burnt clay (*ibid.* 166). How red hills were formed has long remained a mystery, though the deposition of burnt plant matter had been suspected (*ibid.* 168; Rodwell 1979, 133). This suspicion was confirmed at Stanford Wharf Nature Reserve, Stanford-le-Hope, in the Thames Estuary, by chemical and micromorphological analysis of the red hills, which indicated that the mounds were composed of deposits of burnt marsh clay and plants, which had been used as fuel (Macphail *et al.* 2012). Salt-making continued throughout the Roman period at Stanford Wharf, still dependent on burning salt-marsh plants – abundant monocotyledonous fuel ash waste was recovered from hearths, pits, ditches and channels. There were, however, no red hills, suggesting that the salt marsh sediment, which gave the red hills its colour, was not itself routinely collected and burnt. In one area, the residue from the salt making was dumped in layers to form a platform, or ‘black hill’, which was subsequently used as a working surface for salt making in the later 3rd and 4th centuries (Biddulph and Foreman 2012, 191).

Briquetage recovered during the Hullbridge survey was dominated by firebars, but pedestals, slabs, wedges, hearth wall, and rectangular and circular vessels were also recorded (Barford 1995, 175–80). The briquetage assemblage at Stanford Wharf Nature Reserve included troughs, cylindrical and flared vessels, pedestals, hand-squeezed

lumps, clips, and a bellows guard. Structures associated with red hills and other salt-working sites in Essex are generally rare or too poorly preserved to gain useful understanding of how production was organised. The remains of hearths have been recorded at, for example, Leigh Beck on Canvey Island and Peldon in West Mersea (Fawn *et al.* 1990, 21, 70), and at Tolleshunt, near Tollesbury on the Blackwater, the corner of a rectangular clay-lined pit was uncovered (Wilkinson and Murphy 1995, 171). At Stanford Wharf Nature Reserve ([Fig. 10.5](#)), saltern 5808, comprising a hearth, settling or filtering tanks, and two horseshoe-shaped ditches designed to trap seawater, was located on a former middle Iron Age red hill. Pottery from the saltern suggests a 2nd- or 3rd-century date. By about AD 250, four more salterns were established. One saltern (2501) was defined by two concentric penannular gullies, which formed a roundhouse with an external diameter of 17m, and contained a hearth, a three-celled settling tank, and several other pits, postholes and gullies. Another saltern (6090) was equipped with a tile-built hearth, while excavation of a third (5760) revealed pits, hearths and four substantial chalk rubble post-bases which held posts that supported the central part of another roundhouse. Together, this evidence appears to represent a significant intensification of salt production at the site. In another part of the site, a fourth saltern was bordered by a natural channel and a range of salt-related features, including three three-celled settling tanks. All contained abundant fuel ash waste (Biddulph and Stansbie 2012). Three-celled tanks similar to those at Stanford Wharf have also been uncovered at Goldhanger and Osea Road, near Maldon, at Peldon, and Leigh Beck (Fawn *et al.* 1990, 8).

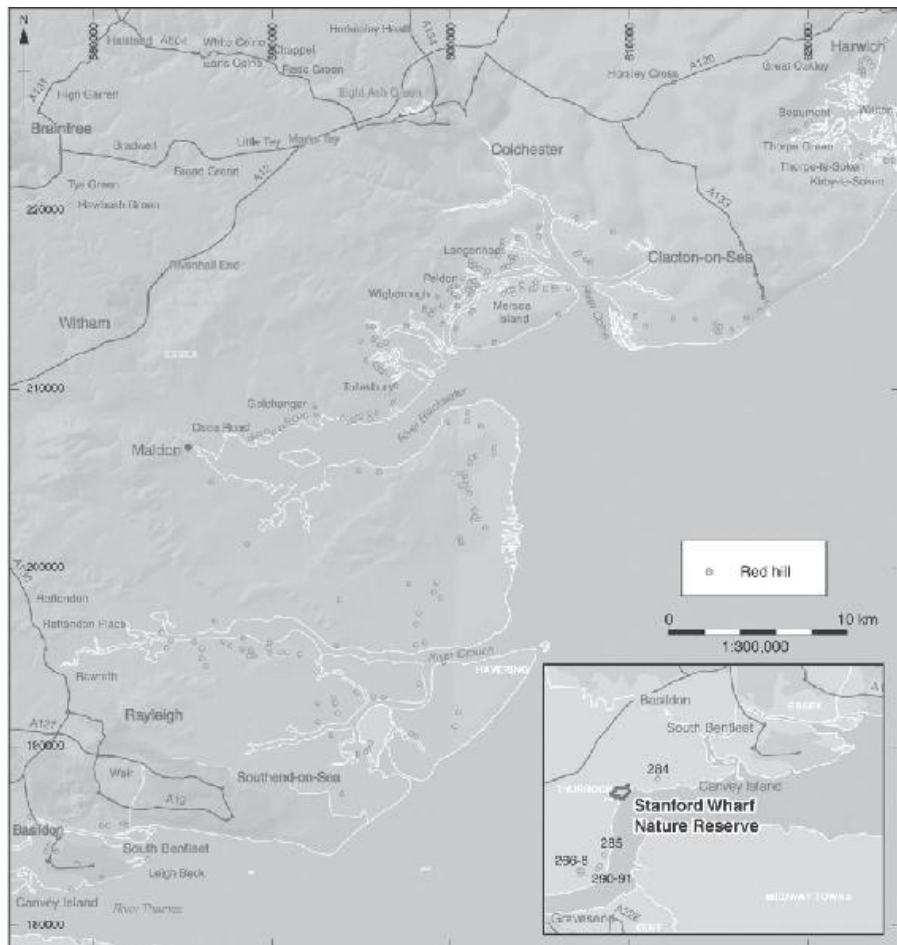


Fig. 10.4: Map showing areas of salt-making in Essex (Biddulph et al. 2012; ©Oxford Archaeology, after Fawn et al. 1990).

Kent and Sussex. Pottery from Goldhanger on the Blackwater, for instance, was consistent with a mid- to late 1st-century AD date (Jefferies and Barford 1990, 75), and a grog-and-shell-tempered butt-beaker or barrel-shaped jar dating to the 1st century AD was collected from a tank at Peldon, near Mersea Island (*ibid.* 74). This chronology has, however, begun to be challenged. The red hills of Stanford Wharf, dated by optically stimulated luminescence (OSL) and glauconite-tempered pottery, proved to be middle Iron Age and among the earliest known in Essex, while the 3rd- and 4th-century date given to the site's salterns has been provided by large, typologically coherent, assemblages of pottery (Biddulph *et al.* 2012). Other salt-making sites in the county could well be of similar date. Pottery dating to the 3rd and 4th century has been collected from other red hill sites on the Blackwater estuary, and at Langenhoe on Mersea Island (Sealey 1995, 71, 76), and Colin Wallace (1995, table 54) notes quantities of 4th-century pottery from one site in the Crouch estuary. A programme of radiocarbon dating of the Essex red hills and a reassessment of pottery associated with salt-making sites is required.

Making salt

It seems scarcely worth stating that seawater was the basis for all salt extraction at these coastal sites. Yet the evidence recorded at the sites is sufficiently diverse to suggest a degree of local, regional and chronological variation. The salt industry in south-eastern Britain was far from a uniform one, although to some extent this apparent diversity is a product of the paucity of scientific analysis of red hills and similar deposits of salt-production waste and the lack of understanding of how associated structures and features were utilised. That said, recent work at, for example, Stanford Wharf Nature Reserve and on the Sittingbourne Relief Road in Kent, has helped to clarify many of the uncertainties. Seawater, the raw ingredient of salt production, was trapped within ditches, channels and depressions cut into the clay of the salt-marsh and inter-tidal zones as the water receded following a period of tidal inundation. The salt pans described at sites at Cliffe and Funton Creek (Thornhill and Payne 1980, 380; Detsicas 1984, 165), the ditch terminal at Chidham (Bradley 1992, 41), and horseshoe-shaped ditches surrounding a saltern at Stanford Wharf (Biddulph and Stansbie 2012, 115) are among the features which are likely to have served this purpose. There the water was permitted to evaporate naturally through the action of the wind and sun. Once the brine reached a certain concentration, it was transferred

to briquetage vessels to be evaporated over the heat of a hearth. The process, subject to the vagaries of the British weather even when carried out exclusively during the warmest months, may have been somewhat inefficient and its results unpredictable, although there were solutions. The presence of burnt flint and cobbles in features at Chidham (Bradley 1992, 35), High Halstow (Thornhill and Payne 1980, 382), Kemsley (Dawkes 2013, 14) and Scotney Court (Barber 1998, 333) raises the possibility that hot stones had been used to heat the water and aid evaporation. Salters at Stanford Wharf appear to have used a different method. Saltwater was collected, but this was used in combination with the ash of burnt salt-marsh plants to create a highly concentrated brine. The ash was placed in filters, allowing seawater, collected in ceramic vessels, to be poured on top of the ash and seep through into pits or tanks below. Alternatively, the ash was steeped in seawater in tanks before being filtered. Through osmosis, salt-marsh plants, such as rush, sea plantain and sea lavender, typically contain a concentration of salt that is equal to or higher than that of seawater, depending on location (O'Donnell 2009, 41). High or upper marsh enjoys the highest salinity levels; while this relatively elevated area of salt marsh is inundated infrequently by tidal water, in warm dry summers, the rate of evapotranspiration – the process by which water is removed from the soil – can be considerable, and consequently there is an increased concentration of salt in the soil (Packham and Willis 1997, 69). The process of producing a highly concentrated brine by washing the ash of burnt marsh plants with seawater was doubly efficient at Stanford Wharf, as the ash had been created by burning the dried plants as fuel to evaporate the brine, which had been placed into briquetage vessels and heated over hearths (Stansbie and Biddulph 2012, 80).

The use of salt-marsh plants to create a brine is somewhat analogous to methods used in medieval Britain and continental Europe. In Britain, channelling of seawater was largely abandoned in favour of exploiting salt-rich sands or silts on inter-tidal zones. In a method known as sleeching, sand from the shore was collected, placed into specially-designed pits or tanks and filtered. Brine was drawn out and, using the conventional open-fire process, boiled to evaporate the water and allow crystallisation. The method is attested on the Cumbrian, Lincolnshire and Dorset coasts (Walsh 1991; McAvoy 1994; Keen 1988a and b). In the Netherlands, salt was extracted during the medieval period, and possibly earlier, using peat and other marsh plants, such as eel grass (*Zostera*). The peat or eel grass was cut, dried,

then burnt, and the ashes mixed with seawater to create a brine, which was filtered and boiled (Tys 2006, fig. 5; van Geel and Borger 2005).

The evidence of burnt salt-marsh plants was revealed in the analysis of fuel-ash slag dumped in pits, hearths and settling tanks at Stanford Wharf and, crucially, the site's middle Iron Age red hills. It is likely that all red hills in Essex were similarly composed. Evidence for the use of burnt marsh plants, however, is not limited to red hills. P. M. Barford (1995, 175) suggested that 'grey-green glassy or grey-white hard porous' vitrified material on the surfaces of briquetage from sites recorded in the Hullbridge survey was related to fuel-ash slag. This material is almost certainly identical to 'white nodules' recovered in abundance from salterns at Stanford Wharf; the nodules were characteristic of ash derived from the combustion of monocotyledonous plant stems and leaves (Macphail *et al.* 2012). Pieces of 'greenish vitreous slag' at Funton Marsh (Miles 1965, 260), the 'greenish slag' found in combination with 'saltern debris' at Decoy Farm, High Halstow (Ocock 1969, 257), or the 'green salt-glaze' recorded on the wall of a hearth at Broomhey Farm, Cooling (Miles 2004, 315) may be similarly interpreted. Indeed, support for the suggestion that salt-marsh plants were burnt at Broomhey Farm is provided by the fragments of rush recorded in burnt earth there in 1929 (Druce 1930, xlviii). Layers of black ash at Funton Creek and grey silt clay at Lydd are in contrast to the red earth of other sites, yet the early Roman 'black hill' and late Roman saltern waste recorded at Stanford Wharf was composed of the same ash of burnt salt-marsh plants that characterised the site's middle Iron Age red hills, but without the burnt marsh sediment that gave the red hills their colour.

However the brine was collected, single or multiple pits recorded at many sites suggest that it was allowed to settle in tanks and perhaps concentrate further. Clay-lined three-celled tanks, well attested in Essex, are matched to some extent by arrays of tanks at Broomhey Farm (Miles 2004, 315) and Funton Creek in Kent, although those at Funton Creek also appear to have served as hearths, with fuel being laid around the walls of the upstanding features (Detsicas 1984, 167). Arrays of tanks may also have permitted the brine to be separated at progressive stages of concentration.

Once a sufficiently concentrated brine was produced, it was transferred to hearths to be heated, allowing the water to evaporate and the salt to crystallise. Good evidence for hearths was recorded at

Stanford Wharf in Essex, Broomhey Farm, Funton Creek, and Kemsley in Kent, and Chidham in Sussex, but evidence for this stage of processing is best represented along the south-eastern coast by briquetage containers and hearth furniture. The containers vary in size, but are generally cylindrical, conical or rectangular, and rested on hearth walls and pedestals. At Stanford Wharf, some relatively long hearths are likely to have accommodated several rectangular containers placed next to each other in battery fashion, perhaps facilitating a continuous cycle of evaporation, crystallisation, and refilling. Wood charcoal was used for fuel at Funton Creek (Detsicas 1984, 167) and Scotney Court (Hinton 1998, 345–9), and at Stanford Wharf charcoal was used alongside marsh plants in some of the late Roman salterns, possibly in response to greater demand for fuel (Biddulph and Stansbie 2012, 163). Briquetage was used at Stanford Wharf throughout the later Iron Age and Roman period, and remained virtually unchanged in form and fabric (Fig. 10.6), but some new technology was introduced in the late Roman period. Exceptionally high concentrations of lead, phosphate, calcium and tin were detected within the floor deposits of a tile-built hearth within one saltern. The presence of tin and lead was presumably from metal vessels used to heat brine, while the phosphate and calcium were associated with fuel ash derived from saltmarsh plants and latrine waste. In another saltern, lead enrichment of the charred sea rush lining of a hearth may also derive from lead evaporation vessels (Biddulph and Stansbie 2012, 164; Macphail *et al.* 2012). Intriguingly, traces of animal or human excrement in both hearths may indicate the use of dung as a slow-burning fuel in addition to the salt-marsh plants. Evidence of lead vessels is not necessarily restricted to Stanford Wharf. Traces of lead were recorded within the 2nd-century hearth from Funton Marsh (Miles 1965, 261), while ceramic building material recovered from the later 1st- or 2nd-century hearth at Kemsley (Clifford 2013, 35) recalls Stanford Wharf's tile-built hearth and may similarly have been incorporated into the structure to support metal vessels.

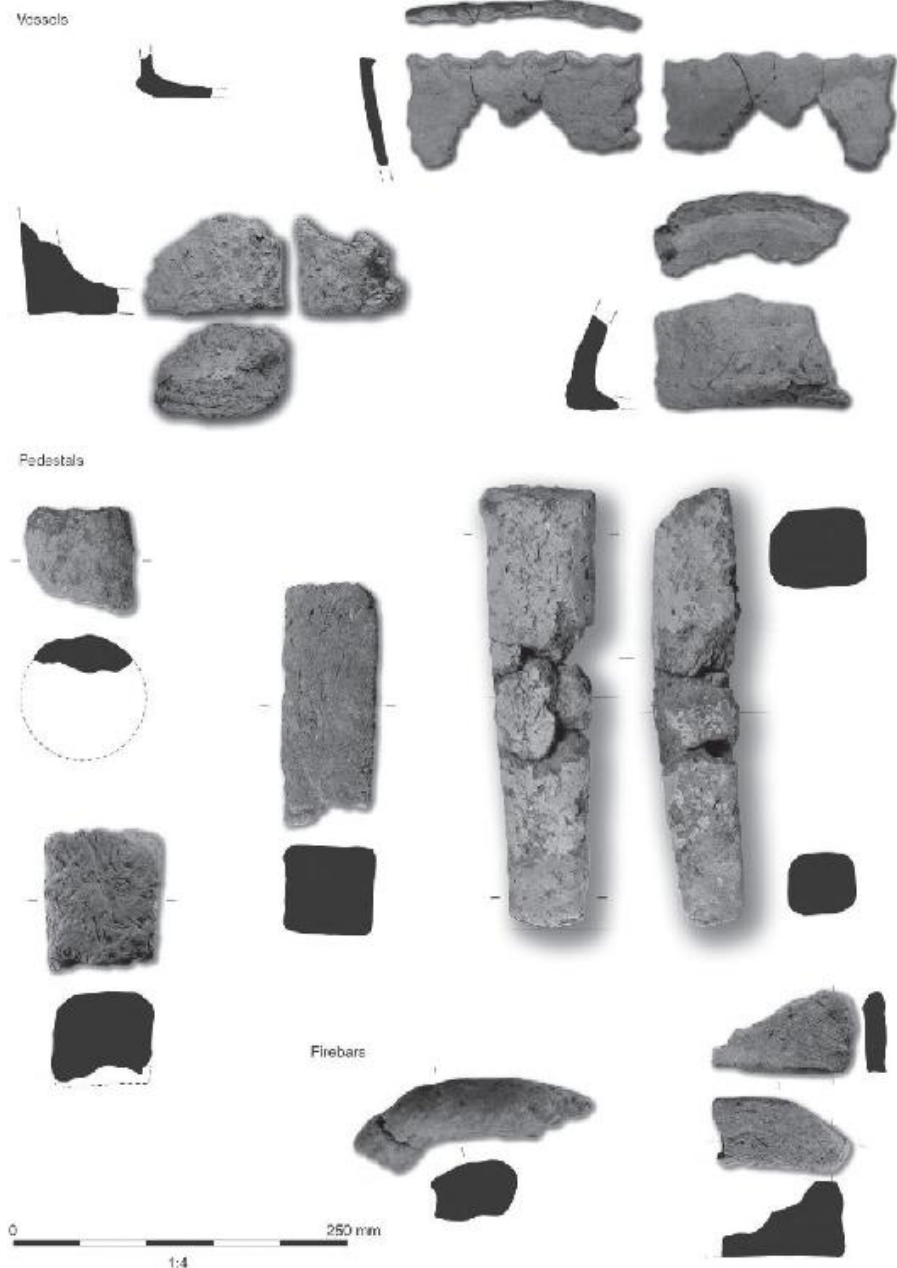


Fig. 10.6: Late Roman briquetage from Stanford Wharf Nature Reserve, Essex (Biddulph et al. 2012; ©Oxford Archaeology).

The discovery of briquetage containers and hearth furniture at elevated sites, such as Bishopstone (Bell 1977, 119), and at sites away from the intertidal zone, for instance Springhead (Poole 2011d, 323) and at Westhampnett immediately north-east of Chichester (Beamish 2008, 218–19), suggests that wet salt was transported to settlements

for drying and distribution. Primary salt production sites may well have seen secondary processing too, but the activities cannot be distinguished on the basis of what would have been identical hearths and hearth equipment, although Richard Bradley (1992, 36) considered that the thicker, larger, briquetage vessels recorded at Chidham were intended for primary salt evaporation, while the smaller, thinner-walled vessels, which were concentrated in a different part of the site, were used for the drying of the salt. If the weather permitted, however, much of the salt collected from the evaporation vessels is likely to have been deposited on the floor of the saltern and allowed to dry naturally, a process leaving little archaeological trace.

Inevitably, most salt production in south-eastern Britain was restricted to the warmest months of the year. Medieval documents indicate that post-Roman coastal salt-working in England was carried out from late spring to early autumn (Keen 1988a, 142–3; Fawn *et al.* 1990, 18), and the optimum period for Roman salt production is unlikely to have been any different (*cf.* Bradley 1975). Doubtless the first task for salters returning to the site at the start of the season was to clean the ponds, settling tanks and hearths, which would have filled with alluvial silt and mud during the late autumn, winter and early spring. This seasonality is supported by evidence from Stanford Wharf. The recovery from the site of seed heads of rush, plantain and thrift at various stages of maturity suggests that the salt-marsh plants were harvested to provide fuel – and possibly to create brine – throughout the growing season of May/June to September (Hunter 2012). It is worth noting, however, that while the middle Iron Age landscape at Stanford Wharf was an open one, with the salt being harvested under the summer sky, the late Roman salt making had been placed largely under cover. This made production less dependent on good weather and may have enabled salters to extend the season.

Distribution

The presence of briquetage at non-salt-producing sites is usually taken as proxy evidence for the trade in salt. The distribution of cylindrical briquetage vessels around Droitwich, for example, points to their use as containers for salt transportation during the Iron Age and Roman periods (Rees 1986; Woodiwiss 1992, 183), and cylindrical vessels have been recorded at the Iron Age hillfort at Danebury in Hampshire (Poole 1991). As noted above, briquetage has been found away from the coastal edges of south-east Britain, but generally the distribution

very rapidly tails off further inland, pointing to the use of briquetage in secondary processing, rather than wider transportation. This appears to be the case in Essex, where Janice Kinory (2012) has confirmed the essentially coastal distribution of late Iron Age and Roman briquetage. While briquetage has been recovered from sites further inland, notably Great Chesterford and Chelmsford, most vessel sherds appear to belong to troughs, rather than containers more suited to salt transportation (Barford 1990, 79–80). More plausible is the use of pottery vessels for salt trade and distribution. A prime example is the early Roman lid-seated, and usually shell-tempered, jar (Fig. 10.7; Going 1987, type G5.1). At Stanford Wharf, pottery vessels in the early Roman phase were confined to such vessels (Stansbie *et al.* 2012, 97). Production of shelly-ware lid-seated jars is attested at Mucking (Rodwell 1973, 22–4) and Gun Hill, West Tilbury (Drury and Rodwell 1973, 82), both a short distance from Stanford Wharf, but it was reasonably widely distributed, reaching central Essex and north-west Kent (Going 1987, 23; Seager Smith *et al.* 2011, 55), and does not appear to have been manufactured outside south Essex. Such factors led Rodwell (1979, 161) to suggest plausibly that the type was used ‘for the storage and transportation of crystalline salt’. The lid-seated jar was one of the few, and perhaps the only, south Essex shelly-ware forms recorded at Springhead, Kent (Seager Smith *et al.* 2011, 55–8). Other shelly-ware jars encountered at that site – bead-rimmed jars, storage jars, hooked-rim jars and faceted jars – are well-known north Kent types, but do not (or rarely) appear in potters’ repertoires in south Essex. This suggests that the jar did not travel with other pottery from the same source, but was isolated and traded for its intrinsic qualities or its contents (Stansbie *et al.* 2012, 99). While the supply of salt from south Essex to north-west Kent has something of a ‘coals to Newcastle’ quality about it, the apparent absence of evidence for primary salt production in that region of Kent suggests that salt was in any case arriving from outside the region. If trade across the narrowest part of the Thames Estuary was as economical as along the north Kent coast, or indeed more so, then there is no reason why salt from south Essex should not be favoured over the Kent product.



Fig. 10.7: Early Roman lid-seated jars (Biddulph et al. 2012; ©Oxford Archaeology).

The Essex side of the Thames Estuary is not the only location at which salt and pottery production coincided. The Hoo Peninsula and the Medway estuary around the Upchurch marshes were the location of a major pottery industry spanning the mid-1st to late 3rd centuries (Monaghan 1987). Luke Barber (2011, 75) noted the similarity between coarse grog-tempered jars found at the salt-making site at Ropetackle, Shoreham-by-Sea, and those from Scotney Court, Romney Marsh, and suggested that their manufacture and use were linked to the salt industry. Rowlands Castle on the Hampshire/Sussex border and some 5km north of Langstone Harbour was an area of another pottery industry dating from the mid-1st to late 3rd century, whose coarse-ware products are known at Chichester, Fishbourne and Portchester Castle (Dicks 2009). Further west, Poole Harbour supported both pottery (famously the black-burnished ware industry) and salt production (Hathaway 2005). With this coincidence of location in mind, we should perhaps look to pottery, rather than briquetage, to address questions of salt distribution. It is interesting to note that petrological analysis of black-burnished ware vessels found in Cooling in Kent and Carpow in Scotland confirmed that pottery was exported from north Kent to military sites in northern Britain

(Williams 1977). Based on this, Miles (2004, 337) speculates that the salt industry in north Kent was linked with this trade. Potentially, traded salt containers may be found among some of the standard products of those industries, for example the necked jar of the later Roman pottery industry in south Essex (Going 1987, type G24), the necked jar or neckless everted-rimmed jar of the north Kent/Thameside industry (Monaghan 1987, types 3H and 3J), the neckless jars with everted rims from Rowlands Castle (Dicks 2009, type D1), or the everted-rim 'cooking-pot' jars with burnished lattice decoration in the case of the Poole industry (Gillam 1957, types 115–48).

Intriguingly, both the lid-seated jar of south Essex and the everted-rim jar of Rowlands Castle typically carried graffiti cut before firing. The graffiti on the former generally resemble Roman numerals, comprising four or five (occasionally up to seven) vertical bars, sometimes divided into two rows by a horizontal bar across the centre (Jones 1972, fig. 2). Those recorded on the Rowlands Castle jars also resemble Roman numerals, typically comprising three vertical bars, with occasionally a fourth running diagonally through the block of three (Dicks 2009, fig. 7). One explanation put forward for both types of graffiti is batch-marks (Dicks 2009, 61; Jones 1972, 337), but given the proximity of the pottery production to areas of salt making, and the rarity of similar marks on any other pottery in south-eastern Britain, it is tempting to suggest that the marks are salt-related. Quite how, though, is far from clear. The symbols may record the weight of contents or have served as a trade mark identifying the saltern that produced the salt or the grade of salt contained in the vessel. Alternatively, the graffiti may represent variations of a limited range of symbols that simply denoted salt. In any case, a close relationship between potters and salters would be implied.

Who ran the industry?

Who owned or controlled salt-production sites, if other than the inhabitants of settlements neighbouring the salt works, is unknown. While many salterns are likely to have been small, fairly *ad hoc* operations serving local markets only, some salt-working sites may have been incorporated into villa estates and controlled as an economic concern along with the crops and livestock. Ceramic building material recovered from Stanford Wharf is likely to have derived from a nearby villa or a satellite settlement (Poole 2012). The villa at Little Oakley in north-east Essex sits close to the coastline on

the edge of marshland, which is occupied by red hills (Barford 2002, fig. 122). A number of villas are known the around the coast of Kent, for example Boxted, Minster-in-Thanel, Sandwich and Folkestone, while in Sussex, villas that may have had access to or control of coastal resources include Angmering, Worthing and Eastbourne. Such a connection is, of course, speculative, but it is worth highlighting evidence at Northfleet villa for large-scale malting and brewing and a jetty built along a backwater of the Ebbsfleet stream, which demonstrates that villa owners could have a stake in the control of estuarine resources and transport. What is more, a seal-box and a theatre mask recovered from the villa, and a well-constructed road leading to it, suggested that the army or provincial government, at least in conjunction with the villa owners, had a significant interest in the villa's economic activities (Biddulph 2011, 228–9). There may have been a similar official interest in some of the larger salt production sites. Tentative support for this comes from other parts of Roman Britain, where the early church, a growing institution in the 4th century, appears to have had a hand in the organisation of salt production. A Roman lead brine pan from Shavington, Cheshire, was inscribed VIVENTI []COPI, possibly meaning 'Of Viventius, the overseer (or bishop)'. Another pan was inscribed CLER, possibly 'clericus' (Penney and Shotter 1996, 360–3). The inland salt works of the West Midlands dominated salt supply in late Roman Britain, largely, it seems, to the detriment of salt production around the eastern and southern coasts. The inscribed pans point to a higher level of state control of the salt works of Cheshire and Worcestershire than was evident at salt-production sites in Essex, Kent or Sussex in earlier times, although Stanford Wharf has begun to challenge that view and to suggest that salt remained economically important in south-eastern Britain into the late Roman period.

High-level interest in the supply of salt is understandable, given the importance of salt for dyeing, tanning, and soap-making, in medicine and religion (Kinory 2012, 105–26) and food supply, particularly for preserving meat and fish and, in the late Roman period, in the production of fish sauces (Maltby 2006). Evidence for the preservation of meat in the form of perforated cattle scapulae has been recorded at Springhead and Northfleet villa (Worley 2011a, 34; 2011b, 45) and, crucially, at Stanford Wharf (Biddulph and Stansbie 2012, 158; Strid 2012). The perforation allowed the carcass to be hung before it was processed further or after it had been jointed and cured. The joints were dry-salted, or, perhaps more likely, given the large quantities of

salt required for dry-salting, wet-cured by being steeped in a brine solution in a brining tub or wood-lined pit (Erlandson 2003, 18).

Perhaps a more remarkable find from Stanford Wharf was abundant remains of tiny bones and scales from small and juvenile fish, including herrings, sprats and smelt, which had been dumped into a ditch enclosing a saltern dated to the mid-3rd century onwards (Nicholson 2012). The evidence strongly pointed to the production of fish sauce, in this case probably a form of *liquamen* or *allec*, rather than *garum* (cf. Grocock and Grainger 2006, 373–4, 381), a product integral to Roman cooking and dining. The late Roman date of the deposit of fish bones was a time when the supply of imported fish sauce products was declining. Spanish amphorae of the sort that carried fish products are largely confined to the 1st and 2nd/early 3rd centuries (Peacock and Williams 1986), and the distribution of Spanish amphorae across the western provinces through time reveals a decline in importation into Britain in the 3rd century (Martin-Kilcher 2003, 81–2). The resulting shortage of fish products is likely to have prompted inhabitants of Britain to manufacture their own versions. Apart from Stanford Wharf, production is suggested to have taken place on the waterfront of Roman London, where a silty deposit above a drain dated to the early/mid-3rd century yielded a mass of juvenile herring and sprat bones (Bateman and Locker 1982). No doubt many salt production sites were used for ancillary activities. Tiny fish bones are rare on archaeological sites, and certainly are unlikely to have been recovered from sites investigated before systematic environmental sampling was undertaken. However, salt production and fishing and fish processing do appear to be related. At the early Roman salt works at Scotney Court on Romney Marsh, fish bones identified as halibut were found to have butchery marks consistent with filleting, possibly in preparation for salting and preservation (Irving 1998). A relatively large number of fish bones, including those of cod, haddock, whiting, mackerel and flatfish, recovered from a deposit associated with a red hill site at Leigh Beck, Canvey Island, were regarded as representing the remains of a fishery (Jones 1995, 191–2).

Beyond briquetage

This review of the salt industry in Essex, Kent, and Sussex has necessarily been brief, and inevitably there are areas that have not been explored, notably the industry's prehistoric antecedents and

environmental and coastal change, although the latter has been comprehensively dealt with by others (Murphy 2014; Rippon 2000). Nevertheless, the review has outlined the extensive distribution of salt-making sites and range of salt-making evidence, and highlighted points of correspondence, as well as diversity, between regions. If there remains uncertainty about some aspects of the industry, particularly its chronology, production methods and technology, and economic impact, then recent investigations provide much hope for future answers. But a re-examination of the results of earlier excavations might also yield further insight. A re-appraisal of pottery and its context, for example, may clarify the dating of sites and shed light on the evolution of the industry, not to mention the use of pottery in salt production and distribution. A programme of scientific dating is also long overdue. As Peter Murphy (2014, 115) suggests in his review of England's coastal heritage, while Roman salt production in England is reasonably well defined, few sites have been extensively investigated, Stanford Wharf Nature Reserve being a rare example. Salt played a fundamental role in the lives of people in Roman Britain. The study of the industry is no less important and worth its salt indeed.

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Chapter 11

Leatherworking in South-Eastern Britain in the Roman Period

Jackie Keily and Quita Mould

Introduction

Compared with other Roman industries there is still only limited evidence for leather processing and leatherworking in Roman Britain due, in no small part, to issues of preservation. However, this picture is slowly changing thanks to improved excavation, conservation and analytical techniques. The amount of excavation work carried out in the capital means that much of the evidence discussed here comes from London but there is a small, and slowly growing, number of sites in south-eastern Britain that can also contribute. This paper begins by looking at the importance of leather as a material and how its use spread, before moving on to what evidence survives that may help us understand something of the organisation of the leatherworking trades during the Roman period.

Survival of the evidence

Our knowledge of the Roman leather industry in south-eastern Britain is rather skewed and much of this is down to preservation of the material. The map of Roman London ([Fig. 11.1](#)), showing the major sites with finds of leather mentioned in the text, illustrates the problem. Vegetable-tanned leather is an organic material that survives well in wet, anoxic environments, that is levels from which air has become excluded (Jones 2012, 8), such as along the banks of the River Thames – where people have been reclaiming land from the river since Roman times – and wet areas where streams and rivers existed in the past, for example the Walbrook. There are large areas of the city however that do not have appropriate preservation conditions and where organic materials are never recovered, and this, of course, limits our understanding as no evidence for the leather trades survives. Interestingly, far less leather has been recovered from Southwark, south of the river, which was a series of marshy islands and tidal inlets providing suitable conditions for the good preservation of organic materials. The area became increasingly well-developed

during the Roman period with docks and jetties as well as both residential and industrial areas but no direct evidence for leather production has been found there to date. Outside the capital a similar picture is found and while leather may be preserved on sites with waterlogged features such as ditches and wells, on the majority of sites, both urban and rural, lacking features below the water table, the organic component of their material culture is completely lacking.

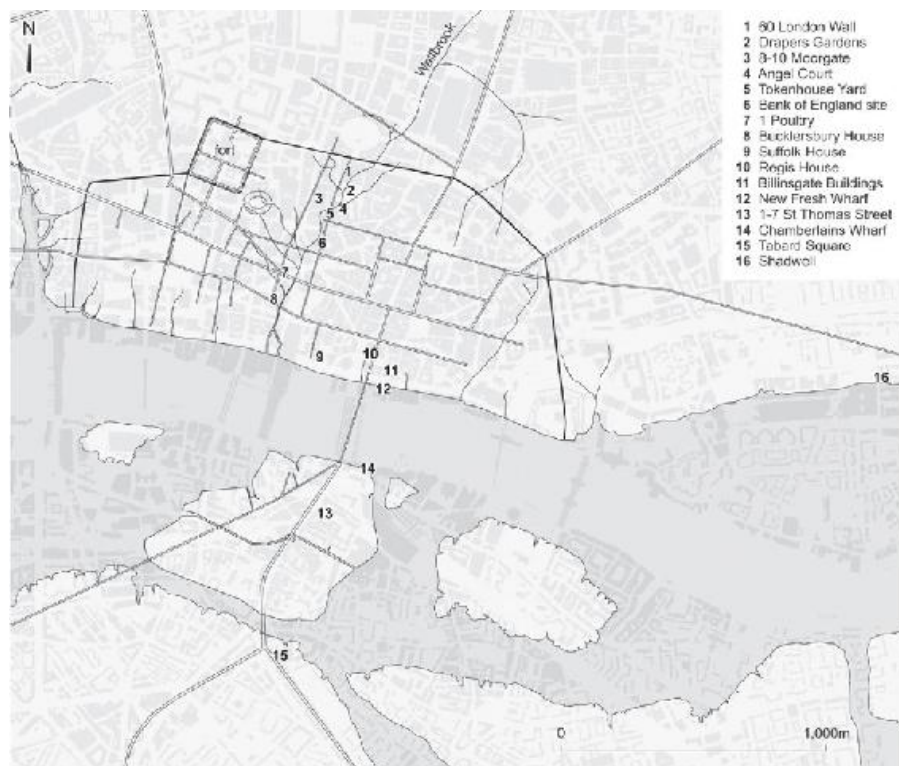


Fig. 11.1: A map of Roman London showing the major sites with finds of leather mentioned in the text (image ©Museum of London Archaeology).

The introduction of leather into south-eastern Britain

The Romans introduced the technology of vegetable tanning to Britain along with sophisticated techniques of leatherworking including complex construction and seams (van Driel-Murray 2001a; van Driel-Murray 2001c, 346, figs 13–14; van Driel-Murray 2002). Before contact with the Roman Empire the native population processed animal skins and hides using a range of methods producing cured skins and pseudo-leathers that rotted under most burial conditions (Thomson 2011; English Heritage 2012, 8), with the result that such material is rarely preserved in the archaeological record. The

introduction of vegetable-tanned leather by the Romans, as van Driel-Murray has so eloquently stated, ‘is a radical change which particularly in the first generation following the conquest undoubtedly carried both political and cultural connotations’ (van Driel-Murray 2001b, 185). As the Roman army marched through the countryside they were wearing shoes of vegetable-tanned leather made using techniques and in styles unknown to the native Britons. They may well have been wearing padded garments of leather beneath their armour and certainly when they pitched camp for the night it was to erect leather tents in which to sleep (Fig. 11.2). Those that followed behind with provisions and stores carried them on carts and wagons protected from the elements by the leather equivalent of modern tarpaulins. Though originally used almost exclusively by the army, the use of this new product quickly spread to the civilian population. To quote van Driel-Murray further there is no question of a ‘continuity of old traditions’ here (van Driel-Murray 2001b, 185) – these are new technologies and fashions. Evidence suggests that in ‘romanised’ towns leather shoes soon became commonplace and other leather goods including bags, cases and upholstery were regularly seen. Eventually, ‘romanised’ footwear of vegetable-tanned leathers was also being worn in the most rural of villages by at least some of the inhabitants, though we do not know how quickly these fashions were adopted outside the capital, and one may suppose that ‘traditional’ methods of skin processing continued in use in the countryside (Mould 2014b). When the Roman army withdrew from our shores the use of vegetable-tanned leather went with them and was not to be in common use again for several centuries (Cameron 2011, 85–6).

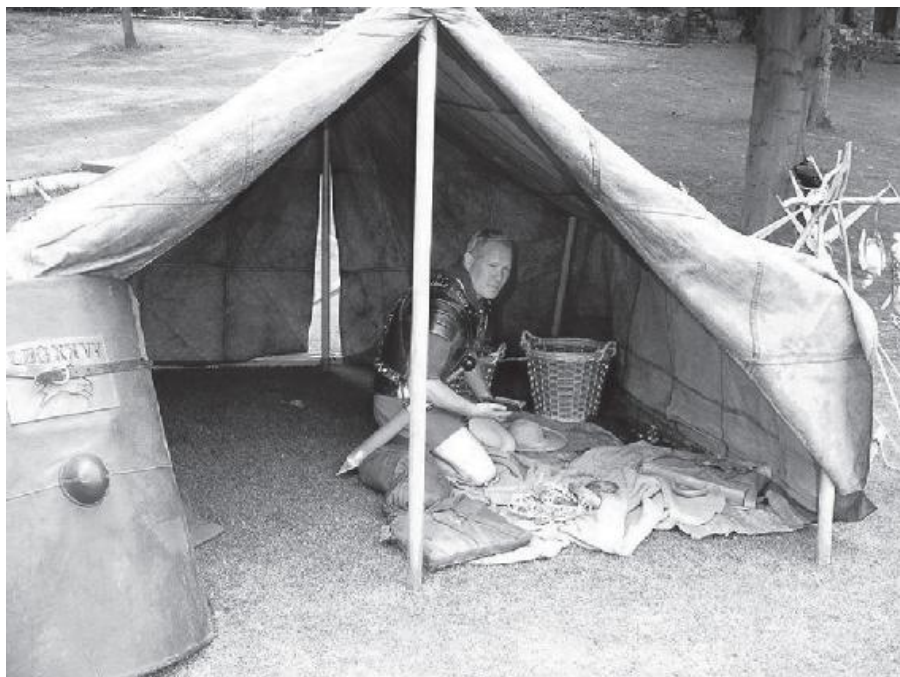


Fig. 11.2: Replica Roman military equipment (image courtesy of the Ermine Street Guard).

How quickly was the use of vegetable-tanned leather adopted?

Some of the earliest assemblages of leather items from Britain come from London where small quantities of vegetable-tanned leather first appear in the archaeological record from very early in the development of the town. At No. 1 Poultry a few fragments, of both shoes and stitched-sheet leather items, have been found associated with pre-Boudican activity dating to the late 40s to early 50s AD (Hill and Rowsome 2011, 26; Keily 2011, table 55, 546–7 and 551–4), although unfortunately these deposits also contained some intrusive material. A group from Regis House, on the north bank of the Thames, is associated with the Neronian quay and closely dated to AD 63–4 (van Driel-Murray 1998). Certainly by the end of the 1st century we find leather being discarded in large quantities and this continued throughout the 2nd and 3rd centuries indicating that it was in widespread and general use by what was by now a largely civilian population.

We can only presume that the use of leather in south-eastern Britain was initially spread by the army. The military used a large amount of leather to make a range of equipment and, certainly to begin with, they must have brought this leather with them. Items

made of leather came in with the army and one can imagine the army also brought in tanned skins and hides in order to replace worn-out equipment and make repairs. The requirements of the military were large and it is likely that production was moved closer to where it was needed as soon as possible. But for just how long did the tanned hides and skins continue to be imported as they must have been at the beginning of the invasion? One would imagine that once tanneries were established in Britain production would quickly be passed over to local entrepreneurs, particularly when the demand for leather increased amongst the wider civilian population. Certainly by the late 1st century the numbers of discarded leather shoes and leatherworking waste being found indicates that there was also a sizeable civilian market for leather but whether the production of leather remained under strict military control we do not know. It may well be that leather tanning was kept under military control for a considerable time in order to guarantee the regularity of supply and the high quality that the army required (but see below). In truth we know little about the organisation of the tanning industry and that of leatherworking in Roman Britain. What is certain is that from a standing start at the invasion it quickly grew to be on a large scale.

The supply and recycling of leather

Until recently it was thought that the process of vegetable-tanning had not changed substantially from the Roman through the medieval to the early modern period (Thomas 1983, 1), but accumulating evidence now points to there being differences in some aspects of the technology employed during the Roman period. While traditional tanning methods have always been regarded as a time-consuming process requiring a considerable outlay of resources, there is reason to believe that tanning in the Roman period was slower, taking two years or more (van Driel-Murray 2011, 74). It is now thought that some of the processes traditionally used to prepare the hides and speed the process of absorption of the tanning agents were not introduced until the Middle Ages (*ibid.*). Indeed, splitting or laminating of archaeological leather is often seen on Roman assemblages and, whilst this may sometimes be caused by the preservation conditions, it may also be due to differences in the tanning process resulting in the tannage not being fully absorbed throughout the entire thickness of the hide or skin. This may reflect a short cut being taken in what was the lengthy process of Roman leather tanning, but whether it was purposefully or accidentally done remains open to question.

Evidence suggests that the supply of leather may have been difficult at times particularly the leather used to make a range of items used by the army. One of the most prominent categories of military equipment, the tent, was made of a series of leather panels ingeniously sewn together with waterproof seams, perhaps best exemplified by tentage recovered from Vindolanda on Hadrian's Wall (van Driel-Murray 1990). It is common to find such stitched-sheet leather items cut up to salvage leather for re-use; often only the discarded seams remain, the rest having been recycled. The tent panels were made predominately of goatskin; indeed other items made of stitched-sheet panels such as saddles, cases and covers are also frequently of goatskin. At Drapers' Gardens in the City of London, for example, none of the stitched-sheet leather that could be identified to species was found to be other than goatskin (Sue Winterbottom forthcoming) and a similar picture is found in 1st-century contexts at Regis House (van Driel-Murray 1998) and Tokenhouse Yard, Southwark (Mould 2012, 43), and in 1st- to mid-2nd-century contexts at Billingsgate Buildings on the north bank of the Thames (Miller and Rhodes 1980, 95–7). Conversely, the vast majority of the stitched-sheet leather items recovered principally from 2nd- and 3rd-century contexts at New Fresh Wharf were identified as being of bovine leathers (cattle hide or calfskin) (Rhodes 1986, 211–16).

Much of what remains of these panels are heavily worn and repaired; holes are patched, slits are sewn back together and burst areas of seam have been re-sewn. Where the original construction was expertly stitched much of the repair work is very crude suggesting that it was undertaken by the soldiers themselves as and when necessary. While this might be easily understandable in the leather equipment thrown away in the northern military zone at the forts stretching along Hadrian's Wall where men were on active service and equipment had to be repaired immediately, it also appears to be the case in southern Britain. At Drapers' Gardens, located along the upper course of the Walbrook valley, 23 per cent of the stitched leather had been cut up before it was thrown away, so that here too leather was actively being salvaged for reuse (Winterbottom forthcoming). This is also reflected elsewhere in London, such as at Billingsgate Buildings, Suffolk House and No. 1 Poultry (Miller and Rhodes 1980, 95; Keily 2001, 105–7; Keily 2011, 551–2). The salvaging and reuse of leather was common and widespread, and while it may suggest that the supply of goatskins may have been difficult at times it is also a reflection of the cost of the raw material and, as ever, the desire to

keep costs down and profits high. Our current state of knowledge makes it difficult to unpick the two but as more leather assemblages are studied in detail we hope to get a better appreciation of the wider picture. A different situation is found at Regis House, however, where whole tent panels with only small faults had been thrown away alongside other items of military equipment similarly discarded despite providing a source of leather that could have easily been recycled (van Driel-Murray 1998). This has been interpreted as suggesting that the soldiers may have been in a hurry to move on; the same feature can be seen at the military establishments at Valkenburg and Vindolanda Period III where it has been associated with major re-deployments of the garrisons (van Driel-Murray 1998). It may also reflect a period when the raw material was readily available and the need for the careful salvage of leather for reuse was not an issue.

Evidence for tanning

In the light of the large quantities of leather recovered from the excavation of waterlogged Roman sites both in London and elsewhere, particularly the military sites in the north of the country, it is perhaps surprising that no Roman tannery site has been found anywhere in Britain, to date. Indeed, the number of potential tannery sites identified from the entire Roman Empire can be counted on the fingers of one hand and only that at Pompeii may be considered beyond doubt (van Driel-Murray 2011, 21–2). In the past, claims have been made for several tanneries in Britain but these claims have not stood up to close scrutiny. The principal evidence used to support these tannery identifications has often been the discovery of large deposits of discarded leather refuse, usually containing a high percentage of worn-out shoes and, in some instances, parts of heavily used and repaired military items of stitched-sheet leather. Frequently what has prompted the misidentification of a tannery has been simply the recovery of leather in quantity; but, as we are all aware, a large dump of old tyres in a lay-by does not necessarily mark the site of a Dunlop tyre factory. So as no physical evidence for a tannery in the form of structures has yet been recognised in Britain and the dumping of old shoes and other items does not mark the location of a tannery, what should we be looking for?

There are three major requirements for a tannery: water, a tanning agent, in the case of south-eastern Britain oak bark, and the raw material. One might assume that location would be determined by the

need for a ready supply of water, easy access to large quantities of oak bark, and proximity to centres of population where meat consumption would provide a ready supply of the basic raw materials of hides and skins. This being the case much of southern Britain would provide a suitable location for a tannery but the best of all would be London where demand was at its greatest. What is understood about the organisation of the traditional tanning industry from medieval and post-medieval sources may not be a relevant reflection of the organisation of Roman leather processing. It may be that salted (preserved) hides were imported from elsewhere and tanned close to the source of the tanning agent (oak bark) in the heart of the countryside rather than the tanning agent being transported to the source of the raw material in the towns (van Driel-Murray 2011, 80–1). So we should consider the possibility of a more complex supply chain and be on the lookout for tanneries in both rural and urban locations.

Many processes are involved in the production of vegetable-tanned leather including flaying the hides, trimming away unwanted parts, cleaning, de-hairing, scraping, soaking in tanning solutions, drying and currying (shaving the thickness, smoothing and working in fats), but they may leave little physical evidence. The site of the initial processing of the carcass may well be located elsewhere and the bone, horns and hooves would certainly be recycled and the remains deposited close to the location of their use, not the tannery. Only recently has evidence provided by animal hair, invertebrates and plant remains associated with the dead stock, stored hides, flesh trimmings and tanning procedures been recognised, described and their importance appreciated; much of this work has been very usefully summarised (Hall and Kenward 2011). Given the relatively insubstantial nature of this type of evidence it is easy to understand why field archaeologists have sometimes over-interpreted the recovery of the more readily recognisable dumps of leather.

When considering leatherworking in south-eastern Britain an example of such ‘over-interpretation’ has occurred at Lullingstone Roman Villa. Here the recovery of 34 shoes and a sheet of leather from an abandoned water tank placed just outside the villa’s former kitchens sparked the suggestion that it had been the location of a tannery (Meates 1979, 105–8, fig. 24). Later re-evaluation of these leather finds, along with the array of other curious items deposited with them in the tank, has produced more considered suggestions that

the tank contents represent the remains of religious ritual, possibly connected with a shrine located within the villa complex or, more likely perhaps, a 'ritual of closure' performed when the tank fell out of use (van Driel-Murray 1999, 5). Thankfully the tannery idea has been quietly laid to rest.

In London the area around the Walbrook is often cited as suitable for a tannery, and so it is, with plentiful running water, the upper part of its course located at the edge of the town and with easy access to a ready supply of hides, the by-product of food provision for the large population which provided a market for the finished product. A large amount of leather offcuts and leatherworking tools has been found and it is perhaps easy to see why the findings of earlier excavations have been interpreted as potential indicators of a tannery site. In his 1991 overview of earlier excavations in the Middle Walbrook valley, Tony Wilmott discussed the likelihood of tanneries being located along the Walbrook and cited Grimes' 'discovery of pegged-out hides, which were undergoing processes associated with tanning' which 'seem to support the contention made by Hume that tanneries were sited in the Walbrook valley' (Wilmott 1991, 172). The presence of high urine levels and large numbers of latrine flies were also quoted as evidence to support the presence of a tannery. These excavations at Bucklersbury House, the famous Temple of Mithras site, were undertaken under very difficult conditions in 1954–5. Grimes himself recorded that 'in the cutting that produced these remains were signs of leatherworking. One surface still bore the surviving portions of a skin held down by the pegs which had been used to stretch it for cutting up; and amongst the fragments of leather were recognisable parts of shoes' (Grimes 1968, 97). Grimes therefore recognised that this was not evidence for tanning but rather of leatherworking, possibly shoemaking or repairing. In the late 1980s, excavations at 60 London Wall, in the upper reaches of the Walbrook, also produced large amounts of waste offcuts, again thought to come largely from shoemaking (Fig. 11.3). Perhaps more significantly, rectangular pits were uncovered, some with a clay lining, and were considered to be possibly associated with the processing of hides, but again no conclusive evidence for tanning was found (Lees and Woodger 1990, 17–18).

Evidence for leather processing

Recently, however, a small amount of new evidence has come to light that may suggest that the post-tanning processing of leather was

indeed being undertaken in the immediate neighbourhood. During excavations at Drapers' Gardens, in the upper Walbrook, large pieces of very thick, inflexible leather were recovered amongst the other leather items found (Mould forthcoming). This hard, rigid material, up to 7mm thick, represents waste material from tanned hides that had not yet been through all the processes required in order to make a leather that could be used to make leather goods. At this stage, the rough, unfinished leather, known as crust leather, had still to undergo the currying stage when the thick inflexible hides were shaved down in thickness and worked in order to produce a supple and usable leather. The crust leather had been thrown away in a box drain located directly outside a building (Building 2) and in a revetted water channel running alongside, suggesting that the 'finishing' or currying of tanned hides was being undertaken in the building during the first half of the 3rd century. As far as is known this is the first occurrence of 'crust leather' from Roman London, or elsewhere in the country for that matter. The study of waste leather from other excavations may well recover similar evidence from other sites in the capital. Recently a large amount of leather has again been recovered from the locality and will, it is to be hoped, provide just such an opportunity.



Fig. 11.3: Shoemaking waste from excavations at 60 London Wall (LOW88[347]). (©Museum of London).

Waste leather can also be a source of information about the organisation of the leather-processing and -working trades. While in no way a common find, leather with incised or stamped letters and

numerals has been found throughout Britain wherever large groups of waste leather have been studied in detail, including London. They usually comprise a series of letters cut or incised into the hide before it was tanned, which are thought to be tanners' marks. They may have been used to identify the tanner, the hide supplier, or the owner of the batch of hides passing through the tannery. Stamped marks are more likely to have been applied after the tanning process, suggesting they were intended to identify the tanner as a mark of quality to a buyer, or the original supplier of the hide, rather than a mark of recognition used during the tanning process itself. Roman numerals are also found on waste leather and may have been batch numbers or possibly the weight of the hide before tanning (Mould 2011, 36). The need for batch numbers would give some indication of the scale of the operations being undertaken.

Some of the incised marks comprise the three letter initials implying the *tria nomina*, the sign of a Roman citizen, indicating that at least some tanneries were controlled by people of some status (Rhodes 1987, 175). Others appear to be fuller names, such as an example incised into a piece of skin cut from the head area of a goatskin found at Regis House: IOR[?]OBRVS, possibly a personal name perhaps containing a Celtic name element (Hassall and Tomlin 1996, 449; van Driel-Murray 1998), and one on waste leather from No. 1 Poultry: FLACCI, the work or property of Flaccus (identified by Mark Hassall) (Keily 2011, 557 and fig. 340). In a study of the inscriptions on Roman waste leather from the City of London and Southwark, of six legible names, four were found to be of Latin origin, and two were considered to be probably of Celtic derivation (Rhodes 1987, 175). As the waste leather considered in the study was thought to date no later than the middle of the 2nd century (Rhodes 1987, 173) it might suggest that the native population became involved in the tanning 'industry' within a couple of generations of the conquest, or perhaps earlier still if the Regis House example is a personal name and does have a Celtic element to it.

Evidence for leatherworking

Evidence provided by manufactured goods

Seen alongside the extremely limited amount of physical evidence for the tanning of leather in south-eastern Britain, in contrast we do have a lot of evidence for the manufacture of leather goods and in particular shoes. While the majority come from London, increasing

numbers are being found from elsewhere in the South-East. The quantities of shoes recovered indicate that the popularity of Roman styles of footwear spread quickly. Initially these shoes must have been imported and sold on by newly arrived entrepreneurs or possibly retired soldiers; we can speculate that the more enterprising may have taken on the role of shoemaker and repairer quite quickly in many towns, with itinerant workers travelling around the countryside visiting villas and farmsteads, peddling new shoes and possibly repairing old, and selling leather for others to make their own repairs. The presence of Roman numerals occasionally noted impressed or incised into shoe soles or insoles may represent size indicators, and, if so, suggests that shoes were being produced in large batches and not bespoke – if you didn't have the money to commission 'made-to-measure' footwear then you could buy cheaper 'ready-mades'. Evidence from London includes 'X' on an insole from Billingsgate Buildings (Rhodes 1980, 118, fig. 66, No. 631), 'XII' from the Bank of England site (British Museum accession no. 1935/11-6/8; *ibid.*), and 'VIII' from Angel Court (Thornton 1977, 67, no. 493 and 69, fig. 21). A wide range of styles and constructions of Roman footwear became available, providing people with choice and opportunity to display their adoption of a 'romanised lifestyle' and 'modernity'. These styles were adopted throughout the north-western provinces of the Empire (van Driel Murray 2001c, 342 and fig. 10). Within this general uniformity there are hints that, eventually, it may be possible to recognise the work of individual organisations or even workshops, by comparison of the various decorative techniques employed. Many 1st- to mid-2nd-century Roman sandals are found with decorative stamped designs on the surface of the insole (Rhodes 1980, 119; van Driel-Murray 2001c, 355) and whilst these are often generic (*i.e.* concentric circles), some are more specific. A stamp of a spread eagle has been found decorating sandals recovered from three sites in London: Suffolk House (MacConnoran 2001, 102, 104 <418> and 23, fig. 20), Drapers' Gardens close to the Walbrook (Mould forthcoming) and The Bank of England (Museum of London accession no. 28.140/9a). A similar stamp occurs on an example from Vindolanda on Hadrian's Wall (van Driel-Murray 1993, 68, fig. 27 and plate 7, L319). The same insole from Vindolanda also features a stamp of a double-handled urn and again examples are found on sandals from London: Billingsgate Buildings (Rhodes 1980, 118, fig. 66, no. 623 and 106, fig. 60, no. 511), where the urn is within two concentric circles, and Bank of England (Museum of London accession nos 14107 and 14108), both

again within circles. A closer examination of these marks might be able to confirm whether the same stamp had been used on any, or all, of them.

Evidence provided by waste leather offcuts

Offcuts from the making of leather goods are found on many sites in London. Of course much of this waste leather has been found in large general dumps of rubbish that may have been brought from anywhere in the city area, but the sheer quantities of waste leather recovered from sites in the Walbrook area, in particular excavations at 60 London Wall (Lees *et al.* 1989, 119; Schofield and Maloney 1998, 273–4) would point to this being a centre of leatherworking in the capital. While some leather offcuts are not diagnostic and could have been produced when making various items, others are of shapes that are only produced when cutting out shoes and so we can be certain that shoemakers were working either in, or close to, this area of Roman London. Shoemaking waste has been found at many locations in London dating from the AD 60s through to the later Roman period. Closely dated groups of leather of 4th- and early 5th-century date are rare in the capital and, as waste leather cannot be independently dated but relies on association with other datable finds, at present it is very difficult to be certain just how late this evidence for shoemaking continues. Recent analysis of waste leather has made it possible to pin down shoemaking activities to a more localised spot along the Walbrook. At Drapers' Gardens there is some evidence for leatherworking being undertaken on the site itself. A room in Building 2 appears to have been a focus of leatherworking in the second quarter of the 2nd century (Phase 5, c. AD 129–160) as the recovery of shoemaking waste, though small in quantity, may point to it being a shoemaker's workshop, an activity that may have continued later into the second half of the 2nd century (Mould forthcoming). While waste leather has been recovered from Southwark, to the south of the river, from sites such as 1–7 St Thomas Street (Dennis 1978, 296–7) and Chamberlain's Wharf (Richardson 1984, 390), the amount is insignificant in comparison to the large dumps of this material from the City.

Evidence provided by leatherworking tools

Another source of evidence for the location of leather workers is the recovery of the tools of the trades, but there are a number of aspects to consider. Of course it is unlikely that such tools would have been simply thrown down and abandoned in the tanyard or workshop when

they were no longer required or considered functional. It is thought that many metal tools may have been recycled in the Roman period (Bishop and Coulson 2006, 27) while others may not survive due to poor preservation conditions. The numbers recovered, therefore, are unlikely to reflect the scale of the activities being undertaken, and it is indeed the case that the quantity of Roman leatherworking tools is relatively small. Furthermore, it is not always possible to identify which tools were used for processing leather and making leather goods, as some, particularly cutting blades and sharp piercing instruments, were common to a number of different crafts. Others, such as 'opportunistic' tools made from bone readily available in the workspace and used for a variety of scraping and polishing duties, may not be easily recognisable to us now (van Driel-Murray 2011, 79–80). That being said, certain tools traditionally associated with leatherworking through the ages are found in Roman contexts (Manning 1985, 38–42; see also Scott, this volume). Such tools include the lunette or half-moon knife (Fig. 11.4), a tool depicted on funerary monuments of Roman shoemakers (for example van Driel-Murray 2001a, 339, fig. 5) and still a tool type considered characteristic of leatherworking today (Salaman 1986, 133–4, 138). Iron awls, sharp points for making holes in leather for sewing, are common finds on many Roman excavations throughout the country, and a number have been found in both Walbrook and Thames riverside dumps. Preservation was such that some still had leather handles surviving usually in the form of a series of leather discs or washers (Fig. 11.5). Hollow punches to cut out small circles, solid punches, creasers and rouletting tools for impressed and incised decoration, as well as more general tools such as knives, shears and dividers would also have featured in a leather workshop. Outside the City, excavations at the Roman bath complex in Shadwell produced an awl and two punches which have been interpreted as evidence for leatherworking in the area (Gerrard 2011, 98 and 99, fig. 94). The iron last, necessary in the manufacture of the iron hobnailed shoe soles so characteristic of much Roman footwear, has not been recovered from London but a rare example of 4th-century date was part of the Sandy Hoard, Bedfordshire in the collections of the British Museum (Manning 1985, 42, no. E35). No wooden lasts have been recognised from excavations in south-eastern Britain; no doubt most were burned when no longer of use.



Fig. 11.4: Iron half-moon knife from London: MOL Acc. No. 24270 (image ©Museum of London).



Fig. 11.5: Iron awls with leather handles from London: LOW88[332] <417>, LOW88[332] <415> and A47 (image ©Museum of London).

Leatherworking elsewhere in south-eastern Britain

Outside the capital the evidence for the leatherworking trades in south-eastern Roman Britain is a great deal more ‘patchy’. Amongst the wide range of Roman material culture found at Ickham, Kent, was a group of leatherworking tools including a half-moon knife, a possible slicker, a possible creaser and several awls (Riddler and Mould 2010, 293–5 and fig. 121). The presence of timber-lined tanks at the site might hint that tanning may have been included amongst the other industries being undertaken at that location, but the nature

of the excavations was such that other branches of evidence, particularly environmental, that might support such a suggestion, were lacking. Much of the evidence, however, derives from surviving leatherwork (Fig. 11.6). Small groups of leather, principally footwear, have been recovered from sites in Surrey, Kent, Sussex and Hampshire; those that are known to the authors are summarised in Table 11.1 below. Large and more informative groups of leatherwork are notably ‘thin on the ground’. It is large assemblages that are so important for study to inform synthetic works such as this. Differential preservation of organic materials will always mean that these large leather assemblages will be unusual, reminding us how rare a material type leather is and why it is so important to study it in detail – waste and all.



Fig. 11.6: Leather one-piece shoe from Kitchenham Farm, Ashburnham, Hastings (image ©Museum of London, courtesy of Hastings Area Archaeological Research Group).

Table 11.1: Summary of leather finds from sites in south-eastern England known to the authors

County	Site		References
Surrey	Beddington	Parts of a one-piece shoe and ten nailed shoes from a well of 3rd- to 4th-century date	Adkins and Adkins 2005, 119–122
Surrey	Market Square, Staines	Shoemaking waste, one piece shoe and nail shoe fragments from undated Roman ditch fill	Mould 1991
Kent	Ickham, Canterbury	Nailed shoes and one piece shoe fragments with very small amount of waste leather mainly from later Roman ditches, pair of nailed shoes from burial with pot dated AD 350–400	Riddler and Mould 2010, 207–210
Kent	Springfield, Southfleet	A pair of stitched shoes of purple leather with gold thread, dated to third century onward, found with inhumations and cremations in a stone sarcophagus	Rashleigh 1803; Walker 1990, 57; van Driel-Murray 2001c, 368–9, fig. 68
Kent	Westhawk Farm, Ashford	Cut-down seam, two one-piece shoes and a nailed shoe from waterhole fills dated AD 150–200	Mould 2008
Sussex	Beauport Park, Battle	Three nailed shoes, stitched shoe and one-piece shoe fragments from area of bath house abandoned c. first half 3rd century at iron-making site	Mould 1985
Sussex	Footland Farm, Sedlescombe	Fragments of upper from two shoes, recovered when fieldwalking an iron-making site	Hodgkinson 1988
Sussex	Kitchenham Farm, Hastings	Nine nailed shoes, a sandal, a stitched shoe, a one-piece shoe and small amount of shoemaking waste found in a ditch dated to late second century at an iron-making site. (Fig. 11. 6)	Mould 2014a
Hampshire	Neatham	Four nailed shoes from late 3rd century pit fills, one from late 4th/5th-century well fill in small Roman town	Redknap 1986
Hampshire	Portchester Castle	Group of nailed shoes from fills of two late Roman wells, largely filled by mid-4th century, at the Saxon shore fort	Ambrose 1975

Casting the net slightly more widely, over recent years an increasing number of small groups of leather have been recovered from what may be considered small rural settlements scattered around southern Britain to the north of the capital, again occurring principally in later Roman features, particularly the backfill of wells and water holes. While shoes from the primary deposits may sometimes be associated with ritual acts of closure, those above are generally the result of domestic rubbish disposal. The occurrence of any waste leather in these small groups, while not unknown, is in such small quantities that it is of very limited significance and certainly insufficient to throw light on the wider picture of leatherworking in Roman Britain. What it does say is that in those particular locations there is direct, if very limited, evidence that the manufacturing and repair of leather goods was being undertaken. The shoes themselves provide evidence that the wearing of these types of ‘romanised’ footwear was popular not only in the urban settlements but also in the

heart of the countryside from the later 2nd century onward (van Driel-Murray 2002, 261), at least by some of the inhabitants. What is more, the styles of shoe chosen to be worn were those seen across the Empire. Small groups from rural occupation sites have been found in Oxfordshire, Bedfordshire, Cambridgeshire, Northamptonshire and Lincolnshire, most excavated in the last ten years or so, and, being published as part of site reports or remaining in 'grey literature', are not always easy to access. Despite this, these small leather assemblages are more important than they may at first appear, gradually expanding what is known about Roman leather supply and use in southern Britain and the wider 'non-military' zone.

What the future may hold

Recent excavations have once again produced major collections of Roman leatherwork from sites located along the Walbrook close to Moorgate (8–10 Moorgate and adjacent sites: Wylie 2011, 8; Maloney 2012, 96) and at the old Temple of Mithras site (Bloomberg Place: Wallower 2013, 242–3), but with the intensive redevelopment of the capital such large assemblages of leather are a dwindling resource. The pressure for increased housing and improved infrastructure will dictate that many archaeological interventions will take place both in regional urban centres and open countryside and smaller, but still valuable, groups of Roman leatherwork will be recovered. It is to be hoped that the resources will be available to allow all this material to be studied in depth and make the information available promptly. In addition, much more work is required re-visiting older assemblages and archives, as can be seen from this brief overview. A study of the tools from Roman London, including leatherworking tools, is to be the focus of a thesis by Owen Humphreys, as part of a collaborative doctoral award between the Museum of London and the University of Reading. Such research, combined with evidence from new excavations, is essential for the better understanding of the development of the leatherworking trades in south-eastern Roman Britain.

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Chapter 12

Working Skeletal Materials in South-Eastern Roman Britain

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The utilisation of animal skeletal materials as tools or other artefacts has a long history, and from the middle Iron Age onwards bone and antler objects can form a substantial element within an excavated assemblage. With very few exceptions, such as the bone styli of continental 1st-century BC form found at Puckeridge-Braughing in Augusto-Tiberian contexts (Trow 1988, 159; Greep 2002), Iron Age objects made from skeletal materials will have been made in the immediate area of their find spot, and the issue of their origin is seldom clouded by having to consider if they were continental imports. The conquest of Britain and the arrival of migrants used to a Mediterranean or Gallo-Roman way of life introduced a much wider range of artefacts made from skeletal materials to the new province. Objects from securely stratified and well-dated contexts of the mid-1st century in military establishments and newly-founded towns can reasonably be assumed to be imports, brought in either as personal possessions or as traded goods, and continental-made items continued to arrive in Britain throughout the Roman period. How soon items in daily use such as bone spoons and hairpins began to be made here is difficult to assess, but it was probably very early (Crummy 2001, 97).

To some extent bone-, antler- and horn-working would have been carried out in all large and small Romano-British towns, closely linked to many other trades and crafts, such as butchery, tanning, leatherworking, glue-making, oil and soap production, marrow extraction, furniture-making and metalworking, but with only a few exceptions the level, extent and economic aspects of the industry are rarely explored in synthetic regional studies. This is hardly surprising, as the waste debris can be confused with that of another trade or with food-waste (Dobney *et al.* 1996, 23), and, unlike an industry such as pottery manufacture, where the artisans made their products in specific locations under controlled conditions and sold through established trade networks, working skeletal materials went on at several levels, from specialist craftworkers to a farmer competent with a knife who could replace a broken pruning-hook handle by slotting

the tang into the centre of a sawn-off antler tine.

Local manufacture of bone and antler items is largely implicit in the recovery of objects made from these materials, especially when they occur in large numbers on urban sites (Down 1988, 78, 82; Bird 2004, 70), but offcuts, unfinished or blundered objects and other waste debris provide more solid evidence of local production. Evidence for horn-working is rare, as the material needs anaerobic conditions to survive deposition, but cattle skulls with the horns removed and dumps of horn cores can be an indication of either horn-working or tanning in the vicinity. All ivory objects found in Britain are imports, no doubt acquired by wealthy individuals as an expression of status; Diocletian's Edict on Maximum Prices of AD 301 valued raw ivory at 150 denarii per Roman pound, one-fortieth the value of silver bullion (Cutler 1985, 25–6). The prestigious nature of this material means that it figures more in the literary sources than any other, so although ivory artefacts make up less than 1 per cent of the objects made from skeletal materials found in Britain, it is mentioned below for comparative purposes (Greep 2004, 403; Eckardt 2014, 97). Another material that might have been imported into Britain is tortoiseshell, used to ornament furniture, but like horn it would need special conditions to survive and none has yet been found here (Croom 2007, 27–8).

Skeletal materials have sometimes been referred to as the plastic of antiquity not only because from the early 20th century onwards bone items such as toothbrushes, combs and dice have largely been replaced by plastic but also because they were used to make a wide range of products (Cool 2008, 148). Some idea of the variety of items involved can be seen in specialist catalogues such as Béal 1983, Mikler 1987, Deschler-Erb 1998 and Gostenčnik 2005. They range from bone and ivory dress accessories and military equipment fittings to bone weaving equipment, antler composite combs and horn lantern windows. Some objects are widespread across the Empire, others are concentrated in particular regions, such as the perforated spoons of north Britain (Eckardt 2014, 146, fig. 5.8).

Before looking closely at the evidence for manufacturing bone, antler and horn objects across the two or three *civitates* of south-eastern Britain, it is worth reviewing the materials, products, equipment, archaeological features and debris associated with the craft, set in the context of the wider Roman world.

Materials, products and production

The bones and horns of cattle were readily available from the carcasses of commercially-slaughtered or sacrificed animals and could be used to make a variety of objects ([Fig. 12.1](#)). Occasionally the bones of other animals, such as sheep, goats and horses were used, and there is some evidence from northern Britain that even the snapped-off ends of cattle nasal bones might be utilised in some way (Maltby 2010, 27, 252–4; Coy and Bradfield 2010, 307–10; MacGregor 1985, 175–6; Greep 1998, 281). Once cleaned, bone is easily and rapidly worked, with practical experiments showing that a veneer leaf and a hairpin could each be made in about seven minutes using only a saw and knife (Crummy 1981, 284). The commercial nature of cattle carcass utilisation and disposal meant that long bones splintered in the course of marrow extraction, glue or grease production and possibly even broth-making provided ideal blanks for long narrow objects, such as pins, needles and spoons (Schmid 1968, 194–6; van Mensch 1976, 163; Dobney *et al.* 1996, 27–8; Filean 2006, 332; Forest 2008; Rees *et al.* 2008, 182–5; Maltby 2007; 2010, 252).

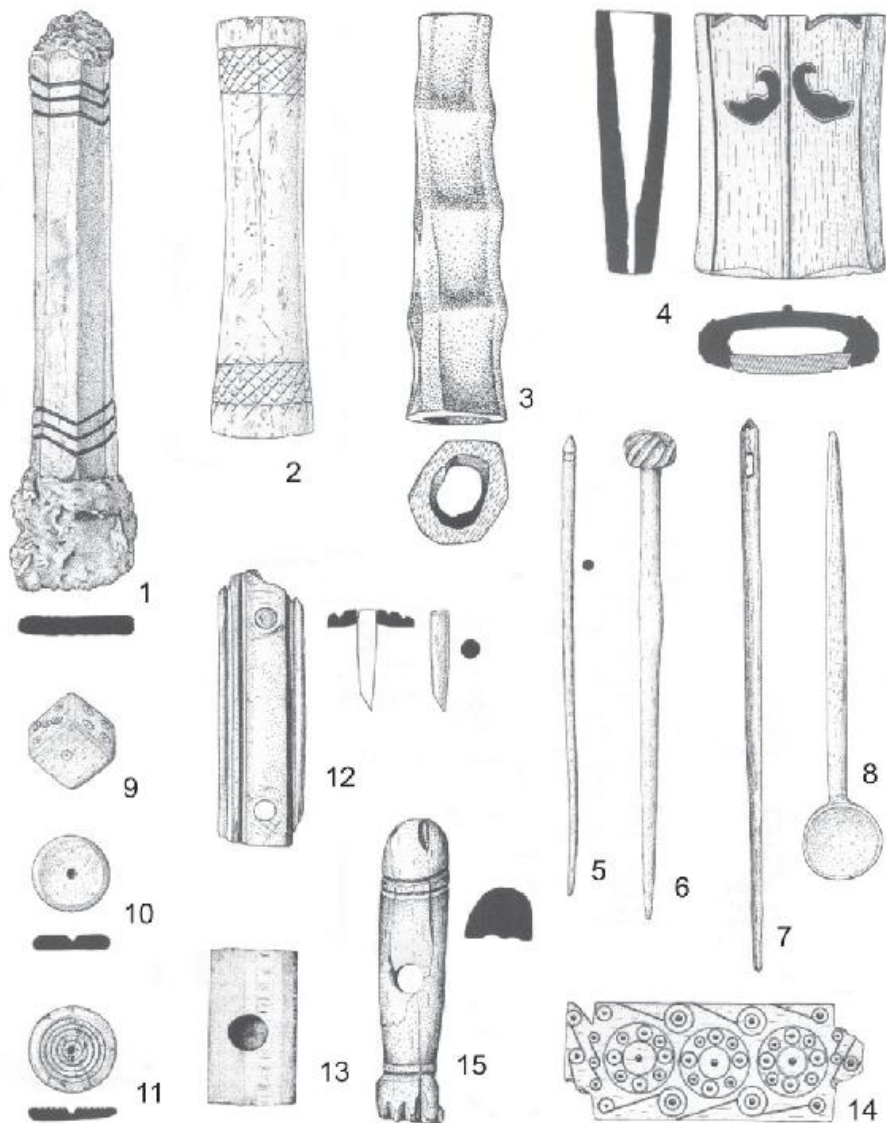


Fig. 12.1: Bone objects. Knife handles (1–2), sword grip (3), scabbard chape (4), hairpins (5–6), needle (7), spoon (8), dies (9), game counters (10–11), veneer (12, 14), hinge unit (13), fist-and-phallus amulet (15). All from Colchester (images ©Colchester Archaeological Trust) apart from 8, from Silchester (image ©University of Reading). (Scale 2:3).

The outer part of cattle horn is made of a hard keratin and when separated from its bony core it can be worked. Some writers in antiquity were uncertain whether ivory was tooth or horn as, being composed largely of dentine, it too could be worked (Pliny, *Nat. Hist.* 8, 4; Pausanias, *Description of Greece*, 5, 12; Scullard 1974, 18). Pausanias classed antler as horn (*ibid.*), but it is a rapidly-growing

form of bone, with a structure and density similar to skeletal bone, that develops and is shed during a single year (MacGregor 1985, 12–21; St Clair 2003, 1–4).

Indigenous red deer supplied most of the antler used for manufacturing artefacts in Roman Britain, although venison forms only a small element of the diet on Romano-British sites (Maltby 2010, 269, table 2.214). Antlers could be acquired post-mortem as a by-product of hunting or picked up in the countryside after they had been shed by living animals in late winter or spring. Antler is a stronger material than bone, with the ‘work to break’ measure of a plaque of red deer antler being up to three times that of one made from a cow tibia (MacGregor and Currey 1983; MacGregor 1985, 27–9). All parts of a red deer antler could be used, often with only minimal working (Fig. 12.2). Roe deer, with much smaller antlers than red, are also indigenous to Britain. Occasionally scraps of worked roe deer antler debris are found and complete antlers pierced at the base from Colchester and from an antler workshop at Pfy, Switzerland, were probably hung up as amulets calling upon a horned god such as Cernunnos or Faunus-Pan for protection (Crummy 1983, 173; Deschler-Erb 2005, 211; Johns 1986; Green 1997, 197–9).

Of all the skeletal materials tooth is the most difficult to modify. It is not bone but a complex of various tissues including cementum, pulp, dentine and enamel. ‘All teeth of wild beasts are unbending and do not yield to art but remain intractable ... if forced the stubborn teeth will break like stalks’ (Oppian, *Cynegetica*, 2.514). The effort was nevertheless made, as in the Roman period the canine teeth of dogs, wolves, foxes, bears and lions were used in sympathetic magic. Pliny recommended a black dog’s tooth as a cure for fever and a wolf’s tooth for teething problems or childhood nightmares and pierced dog canines found in infant burials may represent the dog as a guide and companion for the dead child in the underworld (*Nat. Hist.* 28, 257; 30, 98; Crummy 2010, 52–3).

Bone, being a common and cheap material, was not often commented upon in literary sources except as a poor substitute for the rarer, more expensive and prestigious ivory. Pliny remarked in the mid-1st century AD that ivory was so favoured that the supply from Africa had dwindled and elephant bone was being used as a substitute, although some ivory was still available from India (*Nat. Hist.* 8, 4; Scullard 1974, 261). At around the same time Seneca possessed 500 citrus-wood tables with identical ivory legs (Dio Cassius, *Roman*

History 61, 10, 3), while slightly later Juvenal complained that millionaires only enjoyed food served on table-tops with ivory bases but he himself was so poor that even his dice, game counters and knife handles were of bone (*Satire* 11, 120–7, 131–4).

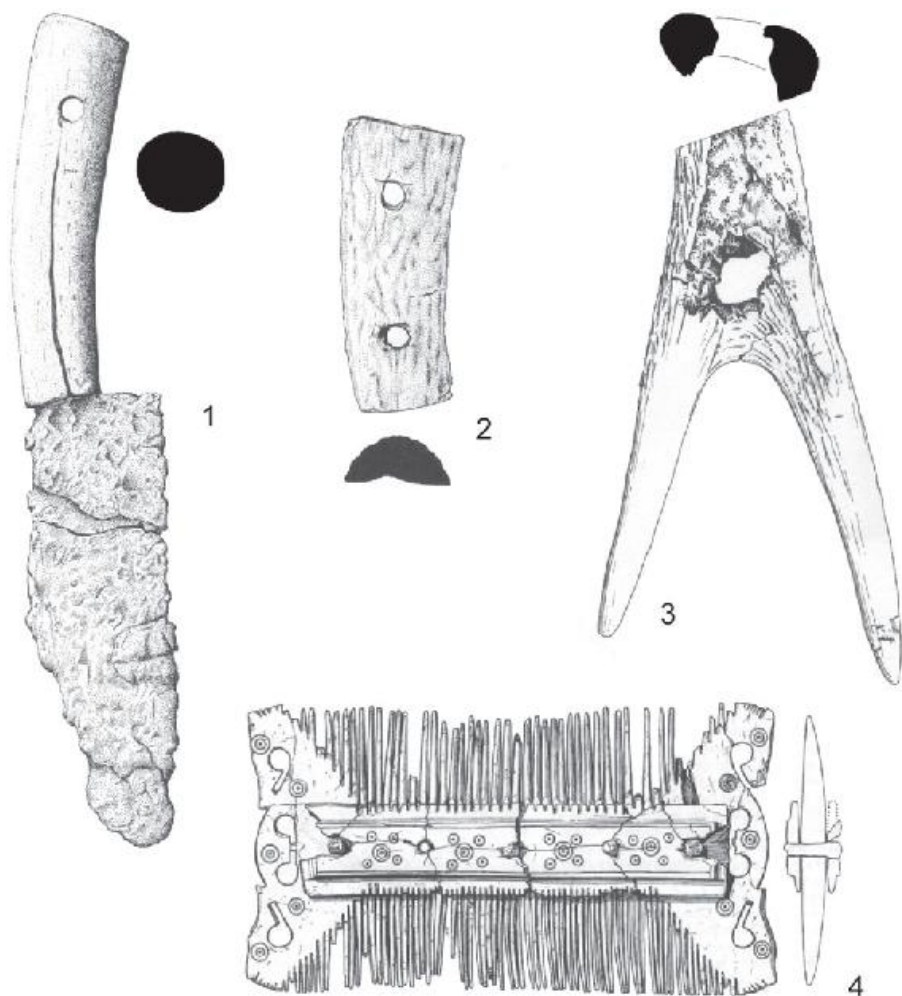


Fig. 12.2: Antler objects. One- and two-piece knife handles (1–2), hoe or rake (3), composite comb (4). (Images 1–2 ©Colchester Archaeological Trust, 3 ©Canterbury Archaeological Trust, 4 ©Winchester Museum Service. 1–2 and 4, scale 2:3; 3, scale approximately 1:2).

There may well have been some differences in antiquity in the way that these materials were first treated, but none of the sources were experienced craftsmen themselves or were describing craftsmen at work. For example, Pausanias (*Description of Greece*, 5, 12) thought that if fire were directly applied to ivory and horn it allowed them to be flattened or formed into any required shape, Dioscorides (*De*

Materia Medica, 2, 87) recommended soaking ivory in beer or cooking it with mandragora root, while in a philosophical analogy Plutarch (*Moralia*, 499E) wrote that bone was softened by ashes and vinegar, and ivory by soaking in beer. Some of these treatments would have worked on some of the materials, others appear to be myth (Engeman 1987, 183–6; Lapatin 2001, 75–6; St Clair 2003, 7–8; Shalem 2004, 39–40; Barbu 2012, 108). Bone, antler and horn would certainly first be cleaned and softened by either soaking or boiling (Crummy 1981, 283; MacGregor 1985, 63–7). The most essential tools were a saw and knife and many bone and antler objects would have been made with these items alone, but other tools may also have been called upon, such as pole-lathes, chisels, gouges, drills, files, clamps, graving, scribing and abrading tools and polishes – much the same kit as used by a woodworker (Crummy 1981, 283; MacGregor 1985, 55–63; St Clair 2003, 49–53; Deschler-Erb 2005, 212). Decorative techniques included staining (usually green or red), gilding, and filling incised ornament with pigments mixed with beeswax (MacGregor 1985, 69–70; Greep 2004; Stern and Thimme 2007, 25; Bartus 2008; Ferrand *et al.* 2013).

Workshop sites

Because the working of skeletal materials was so closely linked to other trades and crafts, identifying workshop sites is not easy. As a minimum, archaeological features would include a hearth, space for a work-bench and a nearby source of water, while a workshop specialising in horn would also need one or more pits or vats for soaking the horns so that the outer keratinous layer could be separated from the core. In terms of material culture, the contents of a bone- or antler-working workshop that had suddenly been abandoned would include tools, large vessels, raw material, blanks and waste debris in the form of offcuts and blundered or unfinished pieces; some end products might also be present. While many rooms in excavated buildings have a hearth, some space and lie close to water, few contain the necessary material culture.

There are continental sites that meet all or some of these criteria. A 4th-century antler bracelet workshop in the *limes* fort of Pfyn, Switzerland, consisted of a hearth sited next to the fort's north wall and a large pit some 3m away; the pit is thought to have held a wooden vat. A scatter of antler debris and some finished items lay between the two features, and further worked debris was recognised

among the food waste (Deschler-Erb 2005). In Colonia Ulpia Traiana Augusta Dacica Sarmizegetusa, Romania, horn and bone waste debris and a few finished products lay within and around a small wooden building that contained a pit for processing the raw material (Barbu 2012, 105–6). Several workshops have been identified in other settlements in Dacia, both civilian and military, with the products, such as hairpins or bow-stiffeners, reflecting the site-type (Vass 2010, 59–61). In Gaul a workshop site at the *civitas* capital of Autricum (modern Chartres, Eure-et-Loir) made spoons and hairpins, and examination of the bone debris produced not only a quantity of unfinished items, unused and partly worked splinters and some offcuts, but also many small shavings, between 0.5 and 2mm across (Canny and Yvinec 2008, 77–9). Workshops in other *civitas* capitals in Gaul also made spoons and hairpins (Bertrand 2008).

There was a close relationship between skeletal materials and some wood and metal products (Stern and Thimme 2007, 21). An assemblage of 1,709 bone inlay pieces and fixings found in a late 4th- or early 5th-century woodworker's shop at Gloucester, and a smaller but no less impressive group of antler inlay pieces from a contemporary workshop at South Shields, would have been used to ornament wooden items ranging from boxes and seats to doors (Hassall and Rhodes 1974, 73, fig. 28, 36; Greep 2015). Although the same tools could have been used for both bone and wood, the absence of bone waste debris in this group suggests that the pieces were bought in from a specialist bone-worker (Crummy 2001, 100). Blacksmiths crafted bone or antler handles in-house for their iron tools. An altar in Rome dedicated by L. Cornelius Atimetus to himself, his freedman L. Cornelius Epaphra and his other associates shows on one face two smiths at work at an anvil and furnace, and on the opposite face a sales cabinet full of finished items including knives with distinctive bone handles (*CIL* VI, 16166; Božič 2002, 35–6; Clarke 2003, 121, figs 67–8). In Britain a more workaday example may be a smithy at Colliton Park, Dorchester, where lines of animal bones were stuck upright into the soil along the 'wings' of the forge and an antler tine handle and three antler tine offcuts were among a scatter of associated non-ferrous objects (Drew and Selby 1938, 61, pl. VII; Durham and Fulford 2014, 20; Greep 2014a, 302, 306, figs 19–20, 178, 180; Crummy 2014, 352).

The specific site of a workshop dedicated *solely* to bone-, antler- or horn-working has yet to be positively identified in southern Britain,

and some claimed workshop sites are open to question. For example, a cluster of finished bone hairpins from a building adjacent to a bath-house at Verulamium has been taken to point to manufacture on the site, but the animal bone supposedly associated with the pins came from layers post-dating the building and it is far more likely that they represent a point of sale than a workshop (Niblett *et al.* 2006, 92–3). General locations for manufacture can sometimes be identified by caches and dumps of waste material found in secondary contexts (Crummy 2001, 97; Greep 2015, 130), but casual disposal often blurs the evidence and the quantity of waste debris recovered is tiny despite the high numbers of bone and antler objects from many Romano-British towns. Acidic soil conditions may in some cases account for its absence, but it is also possible that it was deliberately used as fuel or disposed of on occasional bonfires (Théry-Parisot *et al.* 2005; Vaneekhout *et al.* 2010).

The area around Silchester's forum-basilica is a good candidate for an antler-working site, as the 19th-century excavations on *insulae* I, II and III found that 'stag antlers, both worked and unworked, occurred almost everywhere ... With two or three exceptions the antlers had all been shed, and not cut from the head of the animal after death, and nearly all show marks of the saw or knife. Many pieces are partly worked into knife-handles and other objects ... but no place was uncovered which could be said to have been specially used as a manufactory' (Jones 1892, 285–6). In Winchester several kilos of waste debris from intensive bone processing and the manufacture of early-mid Romano-British hairpins and spoons, along with a few cattle scapulae waste fragments from making weaving tablets, were used to backfill a field ditch at Crowder Terrace in the western suburb, and in the northern suburb more debris from hairpin manufacture was scattered widely in a variety of contexts of varying date at Victoria Road and Hyde Abbey, probably dumped in an effort to raise the ground level of this low-lying area (Fig. 12.3; Crummy 2001, 97–8; Rees *et al.* 2008, 182–94). In the settlement at Woodcuts Common, Dorset, unfinished spoons of the same type were found dumped in a well and other features (Pitt-Rivers 1887, 145). In London small deposits of bone-working debris, again representing intensive bone processing and the manufacture of early-mid Romano-British hairpins and weaving tablets came from several sites in the upper Walbrook valley (Groves 1990, 82–3; Crummy 2001, 98–9). Late Roman dumped debris from intensively processed cattle long bones and scatters of bone-, antler- and horn-working waste were found on sites

in Southwark (Bendrey 2002, 57–9; Pipe 2003; Bird 2004, 54; Yule 2005, 151; Cowan *et al.* 2009, 111–12; Rogers 2011, 166). In Colchester in the early 4th century a remarkable group of waste debris and blundered pieces from the manufacture of furniture inlay or veneer was dumped outside the south-west corner of the town, while in the western suburb partially worked long bone splinters were found in a small abandoned building and two lathe-turned rods, one unfinished, were found nearby (Fig. 12.4; Crummy 1981; 1983, 150–60; 2001, 99–100).

The dumping of waste some distance away from the place in which it was generated is also evident elsewhere in the Empire. For example, at Sagalassos, Turkey, debris from both bone- and horn-working was deposited in the nymphaeum and also in the library after it was destroyed by fire in the 4th or early 5th century (de Cupere *et al.* 1993, 269). Antler offcuts and unfinished objects were dumped in a water cistern and in the amphitheatre at Porolissum, Dacia (Vass 2010, 59), and in Augst, Switzerland, horse and cattle metapodials were dumped in Insula 25 and 207 horn cores in a cellar in Insula 31 (Schmid 1972, 43–8; Deschler-Erb 1998, 273–4, Abb. 366).

Cattle horn cores may be dumped by tanners or horn-workers, and only close systematic examination will determine which craft was involved. Work on post-medieval cores in London has shown that horners of that period removed the tips of the horns and sawed the cores into sections, whereas tanners (and butchers) would chop them from the skull and leave them intact (Yeomans 2008, 137–8). The same criteria can be applied to Roman-period data. Cores from the horn- and bone-working workshop in Sarmizegetusa in Dacia were sawn whereas those from a pit in Winchester were intact and some still had parts of the frontal bone attached (Barbu 2012, 107–8; Maltby 2010, 63–4, pl. 12). A number of complete cattle metapodials and phalanges had also been dumped in the Winchester pit, all non-meat-bearing bones that would be removed with the hide, making this group typical of a tanner's rather than a horner's waste. Many horn cores found at Augst had been sawn into sections whereas those dumped in the Insula 31 cellar in the town were intact; unlike the Winchester pit group they had been carefully removed from the frontal bone with a knife, as if large sheets of horn were required for a particular purpose (Schmid 1972, 47–8).

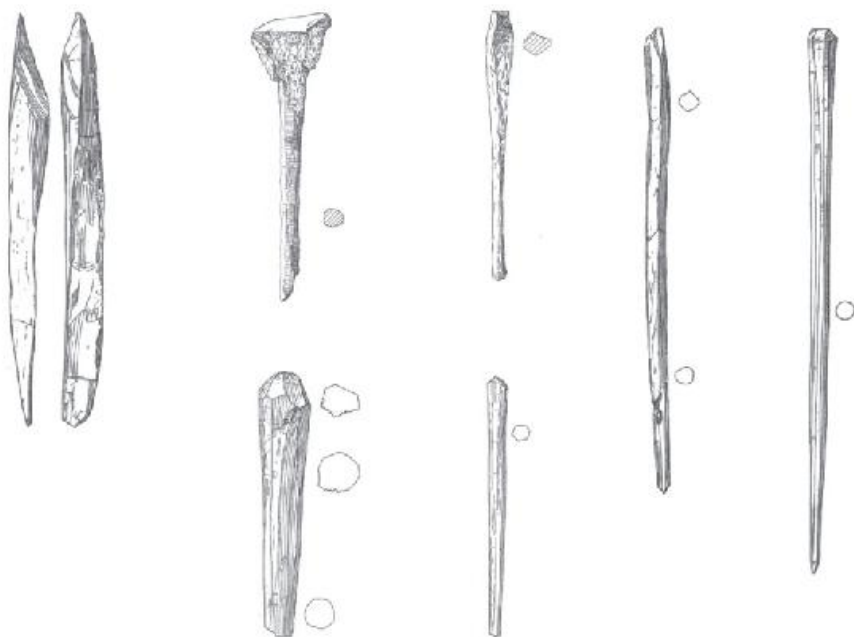
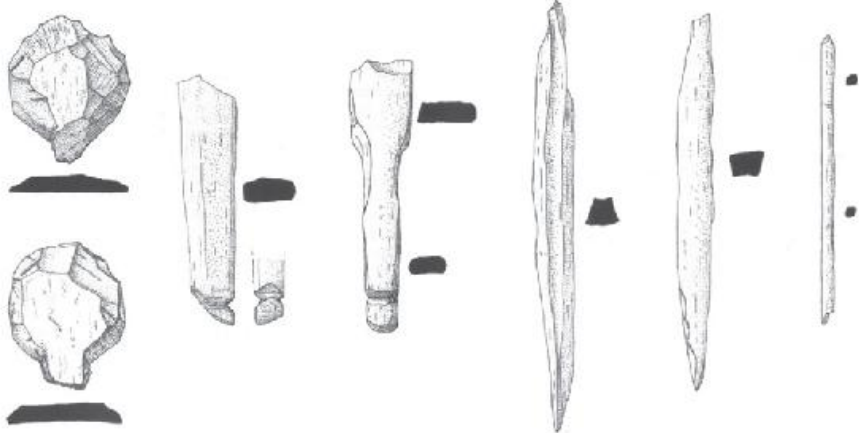


Fig. 12.3: Bone-working waste from Winchester. Top, Crowder Terrace, western suburb. Bottom, Victoria Road, northern suburb. (Images ©Winchester Museum Service; scale 2:3).

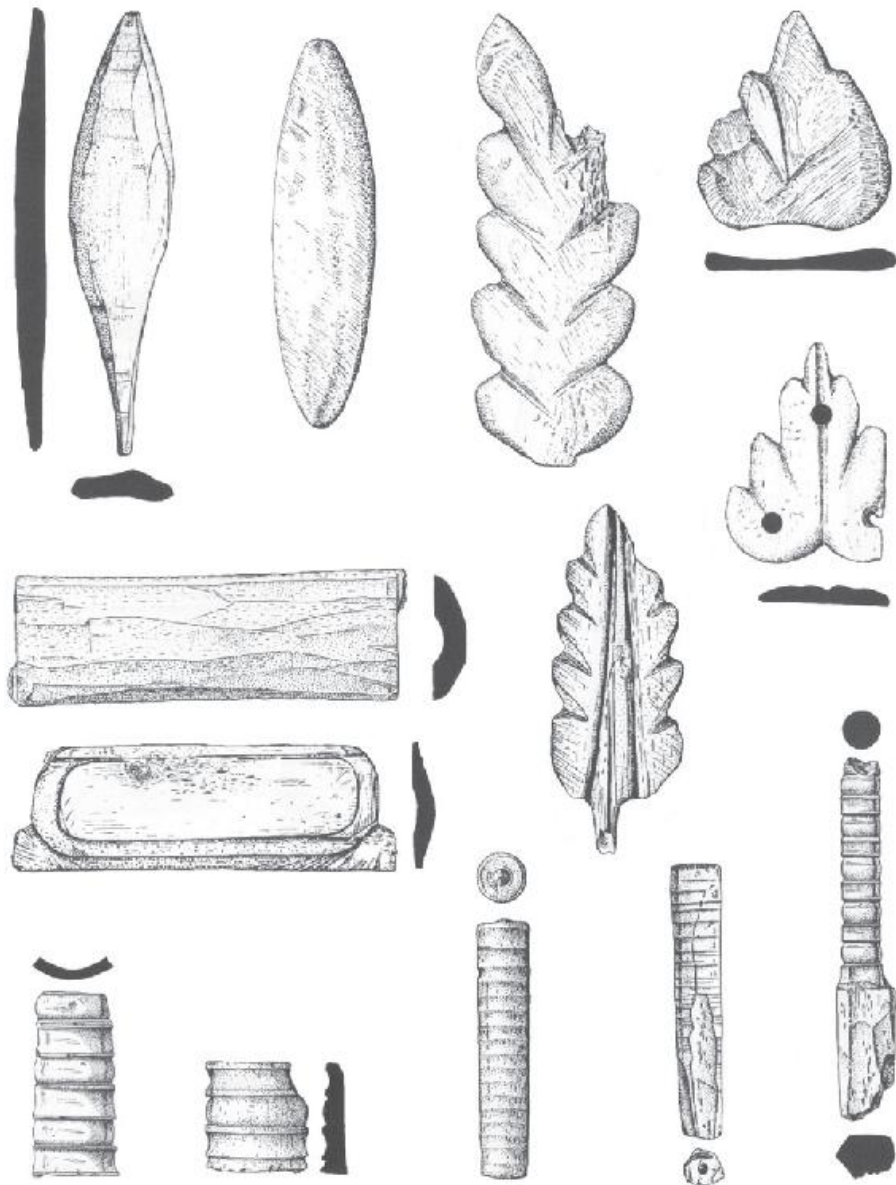


Fig. 12.4: Bone-working waste from Colchester. All from Butt road, south-western suburb, apart from turned rod, bottom right, from Balcerne Lane, western suburb. (Images ©Colchester Archaeological Trust; scale 2:3).

Sampling south-eastern Britain

In order to look more closely at the evidence for working skeletal materials across the modern counties of Kent, East and West Sussex and Surrey, a survey of both printed and online excavation reports noted the presence of four assemblage features and grouped them by

site-type (large or small town, rural, military, *etc.*): 1) intensively fragmented bones, especially cattle long bones; 2) bone-working waste debris or unfinished artefacts; 3) antler-working waste debris or unfinished artefacts; and 4) sawn horn core fragments. The results of this review are summarised in [Table 12.1](#). Far more sites were examined than are listed, as only those with positive results are given here. In some cases there was no published animal bone report (*e.g.* Lullingstone: Meates 1987), and in these instances 'n/a' is given in the column for intensive bone processing. [Table 12.2](#) summarises by function the objects made from skeletal materials on the same sites across the study area, again with only positive results listed. Because of the differences between excavations in terms of area, depth and period of occupation, and because publication of artefacts is often highly selective, the data has been simply moderated by noting only the presence of artefact-types, not their number. In each table multiple excavations from a single place that did not change site-type over the course of its history are grouped together. A wide variety of items came from the extensive early-mid 20th-century excavations at Richborough, but as the available stratigraphic data does not allow them to be split easily between the civilian and military phases of occupation, they may be mentioned here but are not included in the tables.

Bone and antler artefacts are generally absent from both agricultural and industrial rural sites, and even from some roadside settlements such as Westhawk Farm (Cool 2008, 148). In all three counties bone preservation is often very poor outside towns and may have affected the results, but that the absence is a genuine feature of these site-types is supported by comparison with Cambridgeshire, where preservation is good but bone artefacts occur on only about one in ten rural sites and even then only in very low numbers. Long bones shattered to extract the marrow or to make glue or grease – providing splinters of a suitable size for manufacture into items such as hairpins, needles and spoons – were also largely absent from rural sites, as was debris from bone-working, underlining the strong commercial association and urban context of these activities noted above. Exceptions are Broad Street Common, which produced a very few pieces of partially worked cattle long bones and Syndale Park, at Ospringe, where the fragmenting of bones to extract the marrow was noted but some breakage may be due to other factors (Poulton 2005, 77–8; Wessex Archaeology 2003, 19–22). A bone hairpin from Syndale Park came from a well that may be associated with a high-status

building just beyond the boundaries of the site (*ibid.*, 4, 19). On most of these sites evidence for antler-working was also usually absent, but there was a single piece of debris from Wickham Barn, Chiltington in Sussex and three pieces from Broad Street Common, two from red deer and one from roe (Stevens 2001, 59–60; Poulton 2005, 77–8). These few fragments of bone and antler debris no doubt represent *ad hoc* manufacture rather than commercial activity.

Table 12.1: Evidence for working skeletal materials in southern Britain

Site	County	Site-type	Intensive bone processing	Bone- working waste	Antler- working waste	Horn- working waste
Syndale Park, Ospringe	Kent	rural	y	–	–	–
Broad Street Common	Surrey	rural	–	y	y	–
Wickham Barn, Chiltington	Sussex	rural	–	–	y	–
Springhead sanctuary	Kent	religious	–	y	–	–
Wanborough	Surrey	religious	?	–	y	–
Keston	Kent	villa	?	?	y	–
Lullingstone	Kent	villa	n/a	y	y	–
Northfleet	Kent	villa	–	–	y	–
Plaxtol	Kent	villa	–	y	y	–
Beddington	Surrey	villa	–	y	–	–
Fishbourne	Sussex	palace	–	y	–	–
Dover <i>Classis Britannica</i> forts	Kent	military	–	y	–	–
Reculver	Kent	military	n/a	y	y	–
Richborough	Kent	military	–	–	y	–
Pevensay	Sussex	military	y	?	y	y
Ickham	Kent	small settlement	y	y	y	–
Ewell	Surrey	small settlement	y	–	–	–
Springhead settlement	Kent	small town	–	?	y	–
Staines	Surrey	small town	y	–	–	y
Canterbury	Kent	civitas capital	n/a	y	y	–
Chichester	Sussex	civitas capital	–	y	y	?

Table 12.2: Artefact-types present on sites in the region

Site	Site-type	Function									
		Dress accessories	Toilet equipment	Spinning, weaving and sewing equipment	Household goods	Recreation	Tools	Agriculture/ Fishing	Military equipment	Religion	Varia
Synlode Park, Ospringe	rural	hairpin	-	-	-	-	-	-	-	-	-
Farley Heath	religious	-	-	-	-	-	point	-	-	-	-
Wanborough	religious	-	-	needle	hinge units	-	-	-	-	sceptres?	-
Chanctonbury Ring	religious	hairpin	-	-	-	-	-	-	-	-	-
Springhead sanctuary	religious	hairpins, bracelets	-	needles	hinge unit?	die	handles	-	-	-	-
Beddington	villa	hairpins	-	-	hinge unit	counter	handle	-	-	-	hairpin/ needle shafts evangelist tibia
Keston	villa	hairpins	-	-	-	die counter	-	rake pick(?)	-	-	-
Orpington	villa	hairpins	-	needle	spoon	-	-	rake	-	-	-
Lullingstone	villa	hairpins	combs (antler, late)	needles, pin-beater spindlewhorls	furniture cladding veneers/inlay	dice counter	handles, pegs, needle(?) utilised antler tines	-	-	amulets	toggle
Northfleet	villa	hairpins bracelet	-	spindlewhorl	-	-	handle	-	-	-	-
Chilgrove	villa	hairpins bracelet	-	-	furniture cladding	counter	-	-	-	-	-
Fishbourne	palace	hairpins	comb (horn, early)	needles netting hook	spoons furniture cladding	die counters	handle	-	-	amulets	peg, hairpin/ needle shafts
Dover Classis Romanica forts	military	hairpins	-	needles, spindlewhorl	spoons, veneers/inlay	dice counters	handle	-	scabbard chape	-	-
Reculver	military	hairpins bracelets	combs (antler, late)	needles	-	counters	handles	fish harpoon	scabbard chape	-	-
Pewsey	military	hairpins	-	-	veneers/inlay	-	handles, points	-	-	-	-
Island	small settlement	hairpins bracelets	comb (antler, late)	-	-	-	handle	-	-	-	-
Ewell	small settlement	hairpins	-	-	-	-	-	-	-	-	hairpin/ needle shaft
Springhead settlement	small town	hairpins	-	needles	spoon/scoop hinge unit	counters	handles	-	scabbard chape	-	hairpin/ needle shafts peg
Staines	small town	hairpins	ligula	needles spindlewhorl pin-beater	spoons	counters	handles	-	-	amulet	hairpin/ needle shafts
Dover	small town	hairpins	-	needle	furniture cladding	-	-	-	-	-	stylus
Chichester	clothes capital	hairpins	ligulas	needles spindlewhorl weaving combs	spoon hinge units furniture measures	counters	handles, point	-	-	amulet	trial piece
Canterbury	clothes capital	hairpins bracelets finger- ring	ligula	needles	spoons, furniture cladding veneers/inlay	dice counters	handles, point, rake	scabbard chape scabbard slide pointed?	amulets	pegs, hairpin/ needle shafts lute?	-

The evidence from rural sanctuaries is more varied. A single bone hairpin came from topsoil at Chanctonbury Ring and only a point made from a sheep tibia, again representing *ad hoc* manufacture, was found at Farley Heath (Bedwin 1980, 218; Ayres 2007, 75). Wanborough, Surrey, is more akin to urban assemblages, although the quantities involved are small. A needle from the site was interpreted as a votive, and two hinge units were thought to come from a box or boxes used to store more valuable offerings; in addition, two of the sceptres may have had a horn shaft, and one was also associated with fragments of (?)antler (O'Connell and Bird 1994, 111–12; Nicolaysen 1994, 163; Bird 2007, 209–10). All these items were probably brought to the temple rather than made there. Two pieces of antler-working

debris were present and the assemblage may have included deliberately shattered animal bone, with the former, at least, providing some evidence for occasional manufacture at the site (Nicolaysen 1994, 161, 163; Pipe 2007, 244). At the Springhead sanctuary a minimum of 26 hairpins together with two bracelet fragments, two needles, three handles and a die point to the deposition of personal items made of bone, and a hinge unit, like those from Wanborough, may have come from a box containing coins or other valuables (Allen 2011, 395–6). Again all these objects were no doubt acquired elsewhere, perhaps bought specifically for deposition, as only one bone offcut was found and there is no evidence for antler-working or for the intensive bone fragmentation that would have provided splinters for making pins or needles.

Artefacts made from skeletal materials were also well represented at the settlement at Springhead, generally the same types as at the sanctuary, with hairpins again predominating (Allen 2011, 397–402). There was no evidence of deliberate bone fragmentation, only one piece of possible bone-working debris and only three pieces of antler-working debris from *ad hoc* manufacture, providing no hint that the items deposited at the sanctuary were made at the settlement (*ibid.*, 401, fig. 151, 8; Grimm and Worley 2011, 41). The picture is much the same at Ickham, where objects made from skeletal materials were present, but not in substantial numbers compared to those of metal. Although there was evidence for splitting cattle long bones at this site, the varied nature of the six pieces of bone-working debris found there does not indicate commercial utilisation of the splintered bone, while just three fragments of antler-working debris point to only very small-scale manufacture (Riddler 2010; Palmer and Powell 2010, 316–17). Bone objects are scarce at Ewell, and fragmented bones – but not specifically cattle long bones – found at Glyn House so far represent the only hint that any were made at the settlement (Evans 2004, 209).

Fishbourne palace and most of the villa sites produced bone or antler objects. The number of items varied considerably, from ten at Orpington and Keston I/II to over 70 at both Lullingstone and Fishbourne. A one-piece horn comb fragment found in a very early, and secondary, Roman context at Fishbourne might be accepted unequivocally as a continental product were it not for horn-working debris found only some 50 miles away at the rural settlement of Brighton Hill South in Hampshire (MacGregor 1996; Maltby 1995, 55). A remarkable accumulation of 224 cattle horn core fragments

found there has been dated to either the late Iron Age or very early Roman period, and over 125 pieces had saw marks from the removal of only the upper sheath of horn, leaving that around the base still attached to the core. No contemporary accumulations of cores have been found in the region and Maltby has suggested that many of the horns at Brighton Hill South were imported for use in commercial horn-processing (*ibid.*). Small fragments of horn veneer or inlay from a box in a high-status Catuvellaunian female burial dated to c. AD 40–45/50 at Stanway, Essex, are of similar date and support the notion of horn being used for prestige goods in late Iron Age Britain (Crummy *et al.* 2007, 135, 440–1).

At Keston some long bones may have been deliberately fragmented, suggesting that a crudely-shaped hairpin from the site was made there (Locker 1991, 289; Philp 1991, fig. 48, 64; 1999, fig. 39, 966). A few pieces of bone-working waste and/or roughly-crafted items were found at Fishbourne (1), Plaxtol (1), Lullingstone (7; Fig. 12.5, 1–5) and Beddington (3); a rough shaft from Lullingstone is probably hairpin- or needle-manufacturing waste (Fig. 12.5, 5) and there are two unfinished hairpins from Beddington (Cunliffe *et al.* 1996, fig. 210, 2; Davies 2009, 278; Meates 1987, fig. 58, 392–3, fig. 59, 432, fig. 60, 438–9, fig. 61, 444, fig. 62, 456; Wardle 2005, 54–7). Keston produced small quantities of antler-working debris, and an antler rake and possible antler pick from the villa are likely to be products of this activity (Locker 1991, 290; Philp 1991, 161–3). Antler-working debris also came from Northfleet (red deer), Plaxtol (red and roe) and Lullingstone (red; Fig. 12.5, 6–7), and two unmodified antler tines at Lullingstone showed signs of use (Fig. 5, 8–9; Grimm and Worley 2011, 49; Davies 2009, 278; Meates 1987, fig. 61, 449–50, fig. 62, 455, 458).

Objects of bone, antler and occasionally ivory occur regularly on military sites, with female-gendered items such as hairpins appearing alongside military equipment. There was limited evidence for bone-working waste at both the Dover *Classis Britannica* forts and Reculver, including two hairpin rough-outs at the latter (Williams 1981, fig. 43, 235, 239; Chenery 2005, fig. 53, 248, fig. 58, 362), and there was evidence for the deliberate shattering of bones at Pevensey where three points may imply some opportunistic use of the splinters but not commercial exploitation (Powell and Serjeantson 2011, 75; Lyne 2009, fig. 25, 9–11). Small-scale antler-working is represented by an antler tine offcut or crude handle at Reculver and by a sawn-off brow

tine at Pevensey (Chenery 2005, fig. 58, 361; Powell and Serjeantson 2011, 86). Only at Richborough is there positive evidence for antler-working of workshop standard, where an unfinished late 4th- or early 5th-century composite double-sided antler comb was found in the inner stone fort ditch (Henderson 1949, 150–1, pl. 56, 266).

No dumps of horn cores were noted at any of these site-types. At Pevensey one sawn and one chopped horn core were interpreted as evidence of horn-working, but if so, it must have been short-lived (Powell and Serjeantson 2011, 76). The Wanborough sceptres and the Fishbourne comb also hint at the exploitation of this resource in the study area, but both are more likely to be urban products. Under-representation of horn cores at Springhead in the late Iron Age was assumed to mean that they were removed with the hides and sent to a tanner, and one had been cut from the skull, suggesting that at least some were obtained by a horner (as at Brighton Hill South), but the same practice was not noted on the site in the Roman period (Grimm and Worley 2011, 20).

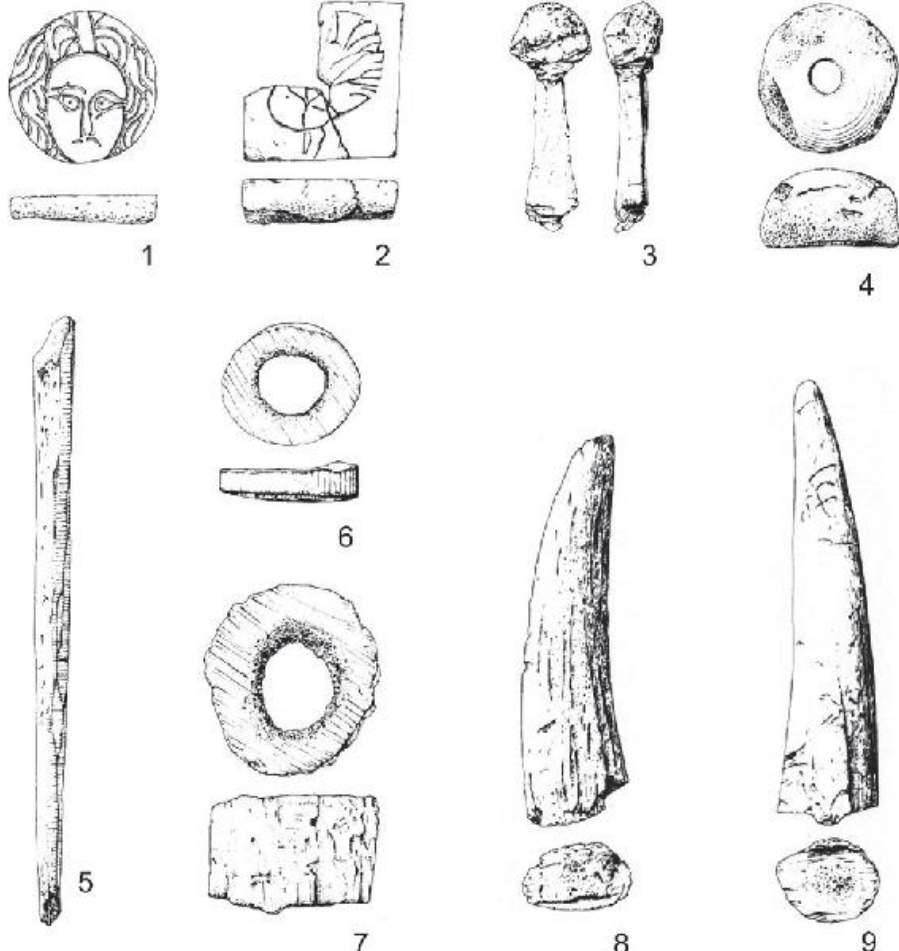


Fig. 12.5: Bone and antler objects and waste from Lullingstone villa. Incised bone plaques (1–2), ?peg (3), bos femur head spindlewhorl (4), hairpin or needle manufacturing waste (5), antler offcuts (6–7); utilised antler tines (8–9). (Images ©Kent Archaeological Society; scale 2:3).

The evidence above suggests that working skeletal materials on these site-types was a minor and generally opportunistic craft activity. Agricultural and industrial sites appear rarely to have used bone or antler, with wood perhaps being the preferred material for the handles of iron tools. Unlike Fishbourne, which had easy access to Chichester, many villa and sanctuary sites were a considerable distance from a town, and distance from urban markets may have meant that wood was generally preferred at these sites too, while also providing the impetus for *ad hoc* local manufacture when occasion demanded. At military sites where bone and antler objects occur in considerable numbers there is scant sign that manufacture took place on-site, let

alone consistently over an entire period of occupation, and only the unfinished comb from Richborough hints at the location of an established workshop at the late Roman fort there. Many items on military sites would have been supplied from workshops producing standardised equipment, such as scabbard chapes, or brought in among the personal possessions of the troops, such as the remarkable bone dice tower from Richborough that probably belonged to a high-ranking officer (Cobbett 2008); part of a second tower came from a high-status house in Dorchester (Greep 2014a, 304, fig. 179).

In urban assemblages, even though objects made from skeletal materials are consistently present on all but the smallest sites, bone- and antler-working debris is still generally scarce. There are only two major towns in the study area, Chichester and Canterbury, both in the south and set close to the western and eastern edges respectively. Many sites in the area may instead have acquired what bone, antler and horn workshop goods they needed from the markets at London, Southwark, Winchester and perhaps Silchester, but some small towns in the region were also a source of supply. The conclusion that bone-working took place on some scale at the Springhead settlement, for example, seems inevitable given the quantity of items from the site – 145 from both sanctuary and settlement, over 120 of them hairpins, needles and pin/needle shaft fragments, all easily crafted pieces. At Staines the evidence for local manufacture also rests largely on the frequent occurrence of bone objects on excavated sites in the town. Hairpins, needles and shaft fragments again predominate, and fragmented bone was recorded on both the Friends' Burial Ground and Elmsleigh Centre sites and on land to the north of the High Street, although no bone- or antler-working debris was identified (Chapman 1984, 115, 232, 117; 2010, 169; McKinley 2004, 29). There is, though, some evidence for horn-working in the town. Dumps of horn cores were found at the Elmsleigh Centre and the horns had been removed from most of the cattle skulls from the same site, as was also the case for some cattle skulls from the Friends' Burial Ground (Chapman 1984, 117; 2010, 169), but horn cores dumped north of the High Street were more likely to be waste from a nearby tannery (McKinley 2004, 29, 48).

Animal bone is rarely mentioned in the *Chichester Excavations* series, but objects made from skeletal materials are reasonably well-represented, with hairpins, needles and counters the most frequently occurring items. Local manufacture is suggested by three roughly-

crafted pins from the Cattlemarket site, a piece of antler-working debris from Chapel Street and a probable trial piece from the north-west quadrant (Down 1989, 208–13; Down and Magilton 1993, fig. 17.2, 14; Down 1978, 315, fig. 10.45, 209). A pierced tooth amulet in a burial was probably part of a bead string (Down and Rule 1971, 113, 115, fig. 5.17, 228n). A small dump of horn cores was found at Rowe's Garage and the same site produced a possible pin rough-out and a piece of bone-working debris (Seager Smith *et al.* 2007, 76). Such a small quantity of material is not unusual in major towns, especially one that has seen as little redevelopment in the town centre and immediate suburbs as Chichester. Bone-working debris scarcely figures in Viner's summary of the crafts identified from Cirencester, nor is it very much in evidence at Dorchester and Silchester (Viner 1998, 310–11; Crummy 2012, fig. 7.2; 2014, 365; Bacon 1978). The methods used to dispose of the waste, the chances of an excavation taking place at the site of disposal, and the selective nature of publication must all be major contributing factors here.

The Marlowe Car Park site at Canterbury produced the largest group of bone-working waste in the region, consisting of a late Roman dump of splintered bone and unfinished hairpins from the *palaestra*, and unfinished hairpins of the same date also came from the Cakebread Robey site and on land south of Burgate Street (Fig. 12.6, top; Greep 1995, 1135). The Cakebread Robey and Burgate Street pins cannot be taken unequivocally as evidence for three separate workshops, but clearly there was at least one in the town in the 4th century. The Marlowe Car Park group was part of very mixed and fragmentary dumped material that was laid down in the *palaestra* and an adjacent lane, both of which tended to become waterlogged, an episode of private or civic improvement exploiting craft waste matched at Winchester and London (Blockley *et al.* 1995, 206–7; Rees *et al.* 2008, 187; Maloney 1990, 119–20). There is unfortunately no published animal bone report for the Marlowe Car Park site, and while Greep (1995, 1135) suggested that the partially-worked waste debris consisted of cattle metapodial splinters, the link noted above between bone-working and fragmentation for marrow extraction makes long bones a more likely source.

Other items from the Marlowe Car Park site provide further evidence of manufacture, including a piece of antler-working debris, a roughly-worked tine fragment (possibly utilised), a pierced tooth and a perforated sheep metapodial (Greep 1995, 1130, no. 913, 1133, nos

925, 928, 1141, no. 998). Two thin bone strips from a late Roman context are probably offcuts from the manufacture of narrow plaques of veneer, and a narrow bone rod from the same context, paralleled in the Gloucester veneer group, is a blank from which short pegs to fix veneer in place would have been cut (Fig. 12.6, bottom; Greep 1995, 1141, nos 992–4; Hassall and Rhodes 1974, fig. 28, 36 xxii). A peg from Colchester is shown in use in Figure 12.1, 12, and others were used on a veneered box from Winchester (Rees *et al.* 2008, fig. 56).

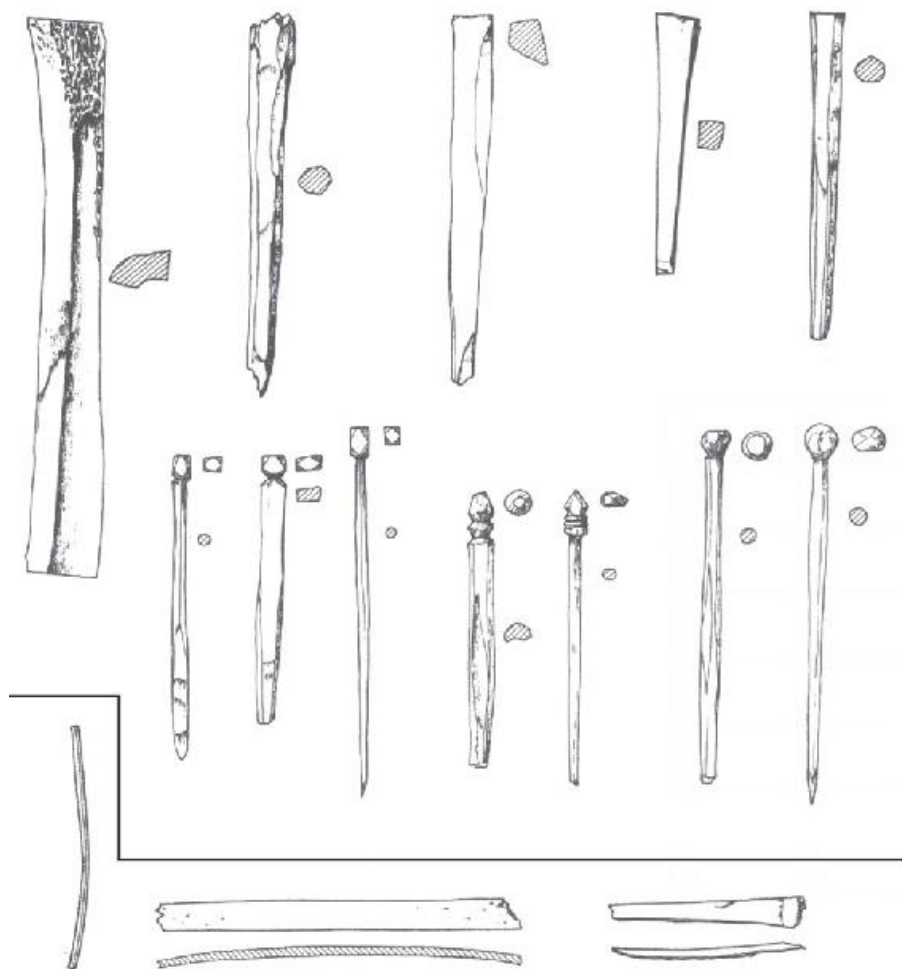


Fig. 12.6: Bone-working waste from the Marlowe Car Park site, Canterbury. Top, hairpin manufacturing waste and finished pins; bottom, veneer offcuts and rod. (Images ©Canterbury Archaeological Trust; scale 2:3).

Conclusions

While a limited review such as this cannot be used to distinguish

between all locally-made and imported objects, [Table 12.2](#) nevertheless reveals characteristics that relate to the evidence for working skeletal materials outlined above. First, the range of artefact-types present in the study area is very limited, leaving aside the various forms each type might take (e.g. tooth amulet, antler burr amulet), but matches those shown in [Figures 12.1–2](#). Second, the most frequently occurring items are hairpins, which along with other long thin objects such as needles and spoons are also the simplest to make from bone splintered during intensive processing. Dice could also be made from splintered bones provided the section was sufficiently large to be trimmed square (Schmid 1972, fig. 7). Hairpins are also the only pieces that can be shown to be both made on a commercial scale in the region and linked with certainty to intensive bone processing. That this took place in the *civitas* capital of Canterbury matches evidence from Winchester, London, Southwark and large towns on the continent, and highlights the role of urban settlements as focal points of demand, manufacture and consumption. Rather than continuous production, the rapidity with which such objects could be made points to short concentrated episodes of manufacture, perhaps by artisans usually engaged in other crafts. In addition, the recovery of roughly-carved hairpins on sites such as Beddington villa and the fort at Reculver is evidence for amateur manufacture on sites without ready access to better-made pieces, and the small quantities of bone-working debris found on many other sites in the region present a case for frequent informal utilisation of this material.

The third characteristic is the regular occurrence of handles. While these could be subdivided by type and material, and some are certainly imports, the chief defining features that concern us here are that they come from composite objects and new handles for iron tools would have been made by a blacksmith rather than a specialist worker in bone or antler. Fourth, no waste debris has been recorded from lathe-turned items such as cladding for furniture legs, hinge units and counters, the very pieces that require specialist equipment and skill and many of which are again parts of composite objects. This does not imply that such products were all imported (turned waste was among the debris from Colchester; [Fig. 12.4](#), bottom), rather that they were probably sidelines made by woodworkers with a pole-lathe and that the bone or antler waste was generally burnt alongside wood debris. Both these characteristics emphasise the links between working in skeletal materials and other crafts, just as it can be linked to intensive carcass processing.

Within the study area antler-working took place at many levels, from the commercial manufacture of late Roman composite combs, to *ad hoc* utilisation on all settlement types. An increased use of antler in the late Roman period on the continent is matched in Britain, with possible contributory factors ranging from economic decline to an increase in hunting, and from changes in carcass processing to the influence of Germanic material culture (Deschler-Erb 2005, 213; Greep 2014b), to which perhaps might be added a greater appreciation of antler's sturdiness.

Horn is rather different to antler and bone, as separating it from the horn core and working it were specialist skills and there is no reason to suppose that it was ever casually attempted. Even though the data from the study area is often ephemeral and open to various interpretations, the sawn and chopped cores from Pevensey demonstrate that horn-working took place there, and the evidence from Staines is also convincing. Most importantly, the links between horn-working, butchery and tanning stress that making use of all skeletal materials did not take place in isolation but within a chain of processes aimed at maximising the economic potential of animal carcasses.

Overall the results from this study of working skeletal materials within the *civitates* of the Cantiaci, Regni and perhaps the eastern part of the Atrebates conform to the picture from elsewhere across Britain and on the continent. Casual use was widespread but not locally intensive, while manufacturing debris on anything approaching a commercial scale generally only occurs in towns, where meat consumption was high, the butchery trade flourished, specialist craftworkers of various types exploited the many by-products that could be taken from the remains of the carcasses, and there was a ready market for a range of finished products.

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Chapter 13

The Development of Iron Production in the Roman Weald

Jeremy Hodgkinson

When Julius Caesar wrote his account of his expedition to Britain in 54 BC he noted the production of iron in the maritime part of the island, and that it was small in scale (*De Bello Gallico* 5, 12). Given that Caesar's incursion was limited to the South-East, probably not much further north than modern Hertfordshire, it is very probable that the intelligence upon which this observation was based referred to the iron being made in the Weald, the hilly region of Sussex and western Kent and its lower-lying periphery, that stretches from the Hampshire border and reaches the coast between Eastbourne and Folkestone.

Iron Production before the Roman period

Field archaeology over the past 75 years has discovered 28 iron sites that can be tentatively dated to the pre-Roman period (Fig. 13.1), and there will be others that have yet to be dated. There is a hesitancy about dating and this relates particularly to the prevalence of native pottery from the late-pre-Roman through to the early-Roman periods in ironworking contexts, and the difficulty in refining the chronology and typology over the period. Radiocarbon dating is also tentative in a number of cases and, although some early dates have been recorded, their reliability is not assured. Most can be dated with some confidence to the late 2nd and 1st centuries BC and into the 1st century AD. However, the isolated dates from charcoal at three sites, at Tablehurst Farm, Forest Row (370 cal BC–cal AD 30) (Hodgkinson 2004, 4), in Cullinghurst Wood, Hartfield (554–354 cal BC) (Hodgkinson 2006, 2) and in Brokes Wood, Southborough (405–231 and 356–61 cal BC) (Nigel Stapple, pers. comm.), point to the possibility that ironworking may have begun in the region as far back as the 6th century BC. From small beginnings, early growth in iron production was on the Low Weald of the Vale of Kent, where a number of small sites have yielded pottery of the 1st century BC (Aldridge 2005, 9–18). A little earlier than these is the site at Knoxbridge Farm, Staplehurst, which was active in the 2nd century BC

(Bonner 2001, 37–8). Known High Wealden activity in this period was confined to Broadfield, in Crawley (Cartwright 1992, 28–59), and to sites like Whitepost Wood, Hartfield (Stevens 2013), and Sandyden Gill, Mayfield, where the recalibration of a C14 date obtained by Cattell (1972) indicates activity between 516 cal BC and cal AD 80. It is not until the 1st century AD that expansion of iron production seems to begin in this less accessible landscape. Caesar’s comment that the iron industry in Britain was small in scale seems to be contradicted by that of Strabo, more than half a century later, who listed iron as one of the principal exports of Britain. But this may not be a contradiction if the number of sites that have been identified in the High Weald by pottery of the 1st century AD represents an actual expansion of output, reflecting the general tendency of areas just outside of the Roman *limes* to become more productive because of the availability of a market. Also, it may well be that local tribal leaders adopted a politically pro-Roman stance which motivated output.

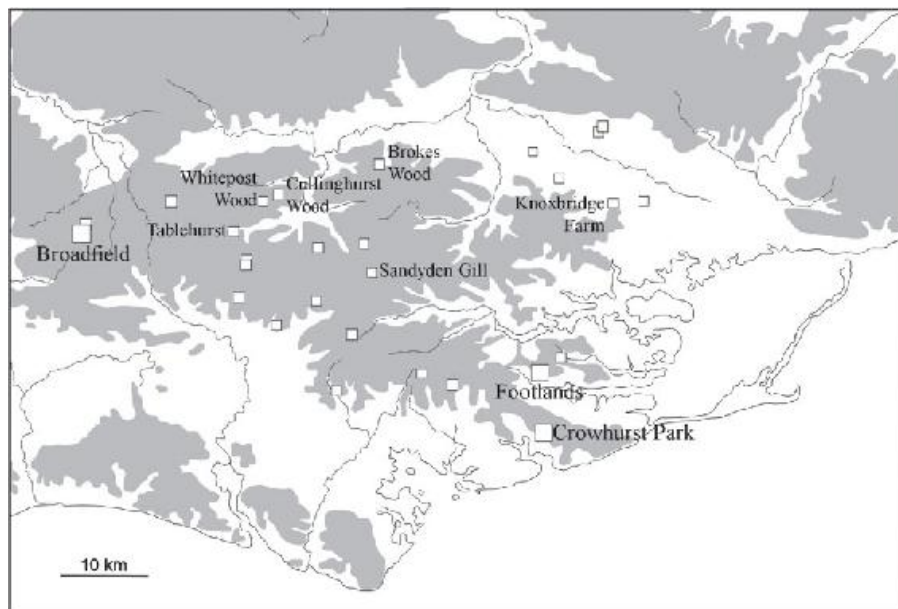


Fig. 13.1: Pre-Roman ironworking sites in the Weald; named sites are mentioned in the text.

The bloomery process

When the Romans arrived in AD 43 to subdue and conquer the island of Britain they were able to exploit ironmaking in the Low Weald that had been active for at least two centuries and had been rapidly growing in the more remote and inaccessible High Weald for nearly

50 years, and the evidence indicates that native practices were allowed to continue. Although all iron at this time was produced in small furnaces, later called bloomeries, it is evident that there were local variations in their form and in the technical details of how they were operated. Structures have seldom survived to the extent that clear comparisons can be made, but the nature of the waste slag found on sites suggests that at least two variations in process were being utilised. One variation of the process is typified by slag that formed into flat masses with vermiform flow patterns on the upper surfaces. This is typically described as tap slag and would have been produced by periodically allowing the molten waste material to flow out of the bottom of the furnace and across the ground away from the furnace. At some sites where this type of slag is found quantities of small cylinders of slag, about 10cm long and 1–2cm in diameter, have been recovered; the process from which they resulted remains uncertain, though was probably related to air input. These were being produced by large smelting furnaces such as those seen at Little Furnace Wood, Mayfield (Fig. 13.2) (Butler forthcoming), and at Upper Wilting Farm, Crowhurst, which is still under excavation at the time of writing. The introduction of furnaces with slag-tapping capability may have been related to ‘Belgic’ incursions into the south-east of Britain in the century or two before the Roman invasion.



Fig. 13.2: Remains of a 1st-century Roman bloomery furnace; Little

The earliest bloomeries had no means of tapping the slag during smelting. They are typified by masses of slag that collected at the bottom of the furnace, and sometimes show evidence of where the slag has flowed over what appear to have been lengths of wood, perhaps used to pack the lower level of the furnace in the early stages of the smelt; where this has been recorded both the flat slabs of tap slag and the slag cylinders are notable by their absence. There was probably a period from the late Iron Age into the Roman occupation where both practices were in operation, and the variety of the large number of furnaces excavated at Broadfield testifies to this.

Sites were located where there was ready access to iron ore. The most common ore in the Weald is siderite, an iron carbonate, which occurs as nodules in thin layers within clay horizons in the Cretaceous Hastings Beds and surrounding Weald Clay. The most abundant source is in the lowest levels of the Wadhurst Clay close to its interface with the older Ashdown Beds. This ore varies in quality because of the differing conditions that were prevalent when each bed was laid down in the geological past. In the early modern period writers noted that some beds of ore were easier to smelt than others and it would be surprising if the operators of bloomeries during the Roman occupation did not have the same experience, restricting ironmaking to certain locations. Prospecting for ore was probably easiest where layers outcropped on the sides of the narrow valleys, or gills, which are a feature of the High Weald landscape. Although water was not an essential element in the iron-making process, as it was to become after the 15th century, it had many uses that made the location of sites near water advantageous. These included puddling clay for furnace construction, as well as safety and refreshment. Prior to smelting, the ore was burnt on open fires to oxidise the carbonate, to break the lumps into smaller pieces, and to make the ore more porous for the hot gases in the smelting furnace. Because of the occurrence of ore in the Wealden clays and preponderance of iron sites close to streams, it has been observed that the organisation of sites often follows a pattern (Fig. 13.3). The tendency is for sites to be found on better-drained, sandy soils, sometimes at a distance from ore sources in clay strata. Natural slopes were used to move raw materials downhill to where they were smelted, with waste slag deposited in heaps further down the slope, such morphology being found on the sides of stream valleys (Hodgkinson 2008, 32–3).

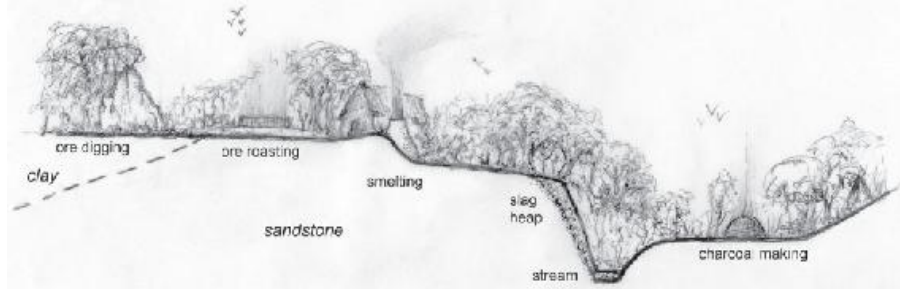


Fig. 13.3: Diagrammatic cross section of a typical Wealden bloomery site (©estate of R. Houghton).

Quantifying Roman iron production

The effect of the Roman invasion on the production of iron in the Weald seems to have been pretty swift. Several sites established before the conquest, such as those at Broadfield, Crowhurst Park and Footlands grew in importance as a consequence of the increased demand that the new Roman province created. Smaller sites such as at Eridge Park (Money 1979, 258), originally a settlement associated with an inland defensive position, also continued in operation, the presence of samian ware suggesting some subsequent Roman-period involvement.

The 28 sites dated to the Iron Age represent about 15 per cent of all the dated bloomery sites in the Weald. Those from the Roman period number nearly 120 and are about 62 per cent of the total. While there are many caveats to this simple statistic, such as the absence of fieldwork in some areas, and the greater likelihood of recovering datable artefacts from sites occupied in the Roman period, it is nevertheless evident that the Roman occupation led to as much as a four-fold increase in the intensity of ironmaking in the region, and probably much more given that many of the post-conquest sites produced substantially more iron (Hodgkinson 1999, 68–72).

Of the hundred or so bloomery sites that came into existence in the Weald from the second half of the 1st century more than three quarters were of modest size, operating for no more than a few seasons at the most. This could have been for a number of reasons: ore sources were used up, or personnel changed, to name but two. The scale of production at any site can best be assessed by quantifying the waste slag that remains. Sometimes a proportion will have been used to surface roads and tracks or provide hard core for field gateways or building foundations. Often there is no way of knowing when this

might have happened, for the Romans themselves made ample use of slag for road metalling in the Weald. Equally, the excavation of Roman slag for road surfacing at some notable sites in the Victorian period has been documented (Lower 1849, 171–2; Rock 1879, 169–71). So any assessment of the quantity of slag remaining on a site is subject to those provisos. Without full excavation and quantification of the slag an accurate measure is impossible, and the number and size of sites precludes that in all but a few cases. The author has estimated the quantity of slag and other waste at Wealden bloomery sites known to have been operating in the Roman period and proposed a four-stage grouping according to the potential output that amount suggests (Hodgkinson 1999). Nearly 50 per cent of the sites were those with the smallest output. Typical sites in this group might be those in Pippingford Park, Hartfield, excavated in the early 1970s (Tebbutt and Cleere 1973), and at Smythford, Worth, excavated in the 1980s (Hodgkinson 1985). In both cases a single furnace showed evidence of having been used over a relatively short period, producing as little as a few tens of kilograms of iron. Such sites may have been operated by regular visitors from outside of the High Weald, possibly in conjunction with seasonal animal foraging, who might have returned with unforged blooms to their home settlements to work them up for domestic use or trade.

Just over 30 per cent of sites were as much as ten times the size of the smallest ones. In these instances, the operating period may have lasted many years, with some sites perhaps being abandoned and revived. Sites on this scale range from the small groups of furnaces at Cow Park, Hartfield (Tebbutt 1979), to those at Holbeanwood, Ticehurst (Cleere 1970, 11–12). The numbers of furnaces indicate working over several years producing a few tons of iron. The possibility that more than one furnace may have been operating at a time suggests locally-based workers.

A little more than 15 per cent of sites produced at least ten times as much again as the previous group, and include those at Bardown, Wadhurst (Cleere 1970, 2–11), and Great Cansiron, Hartfield (Tebbutt 1972). Excavation at Bardown revealed the presence of buildings, and surface finds at Cansiron have yielded a variety of pottery that has suggested settlement there. Recent geophysical surveys have confirmed the extent of these two sites and revealed intriguing clues as to their layout ([Fig. 13.4](#)). It is reasonable to conclude that other sites of a similar scale, such as Romden, near Smarden (Worsfold

1931, 82–3), and Oldlands, near Maresfield, (Lower 1849, 171) were similar in their extent and scale of operation.

The largest ironworking sites in the Weald in the Roman period fall into a select group, comprising less than 5 per cent of the total, and may have had an output two or three times the largest in the previous group. Although none of their working areas has been thoroughly investigated, the excavation of the substantial bath-house at Beauport Park, between Hastings and Battle (Brodribb and Cleere 1988), together with the reports of the very extensive slag heap quarried away in the 19th century (Rock 1879, 169–71), are indications of the importance of the site. Limited geophysical surveying during the Time Team dig there in 1998 showed an area of high magnetic response to the north-west of the bath-house (Gater 1998, 2–3), and unpublished small-scale excavation and fieldwork by the late Gerald Brodribb and others have revealed a probable habitation area to the east. At Footlands, north of Sedlescombe, a recent magnetometer survey has shown the extent of that site, with workings along a well-defined slag-metalled trackway stretching for more than 400m, and indications of settlement (Cornwell and Cornwell 2013, 14–15).

What the estimates of slag/waste volume also show is that nearly 90 per cent of the output in the Weald in the Roman period was generated by only 20 per cent, the two largest groups, of the sites (Fig. 13.5). With less than a third of the known bloomery sites in the Weald having been dated and, of those, just over 60 per cent of the Roman period, it can be reasonably inferred that a similar percentage of those still to be dated may also be from that time. However, as the majority of them are small sites with only modest output, the proportion responsible for the bulk of production is likely to be smaller still.

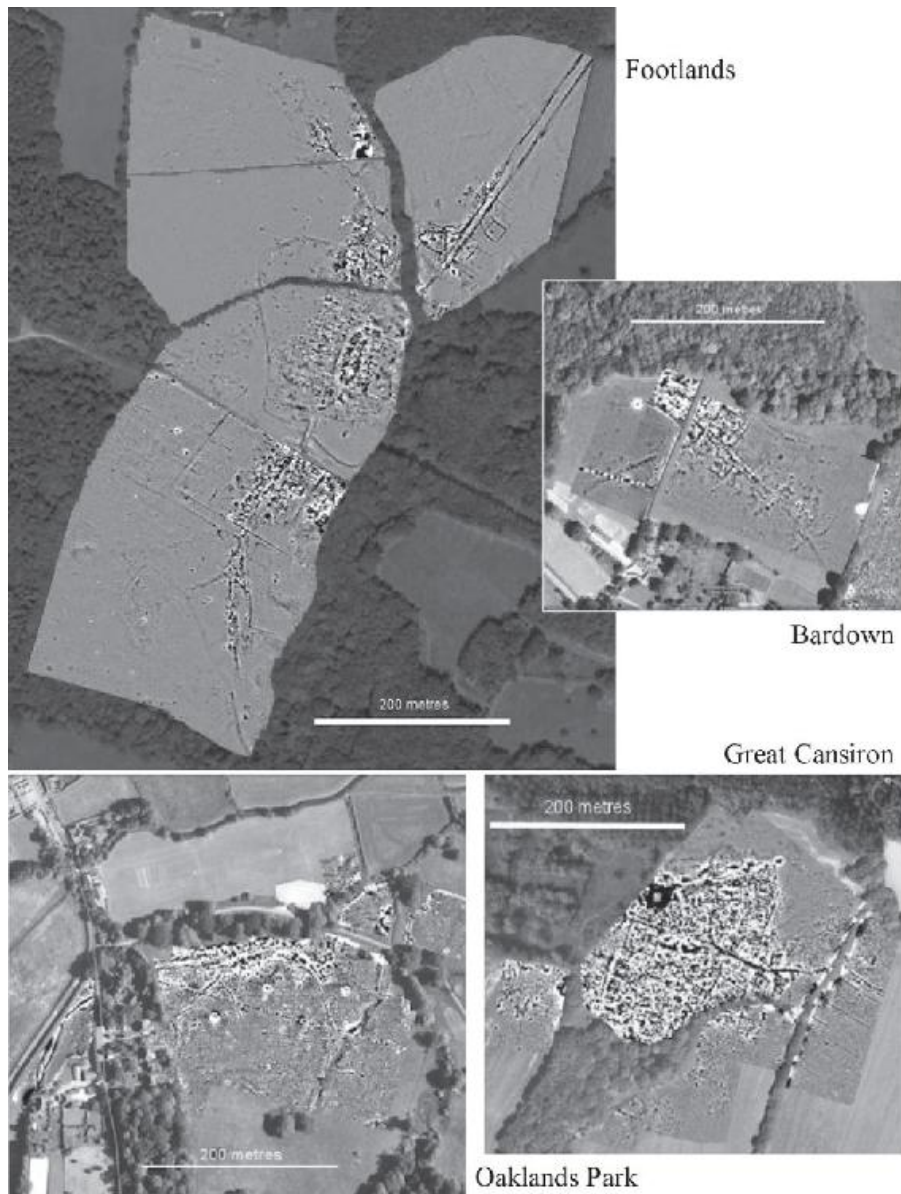


Fig. 13.4: Scaled comparison of four major Roman iron sites (©D. Staveley and Hastings Area Archaeological Research Group).

To facilitate the movement of personnel and materiel between Gaul and Britain a maritime fleet was established for the conquest. The *Classis Britannica* had bases on opposing sides of the Channel, at Boulogne and initially at Richborough, though later at Dover (Cleere 1977). As well as transportation the fleet also appears to have sourced raw materials for the developing province. At five locations in the Weald that were either directly or indirectly associated with ironmaking, roofing tiles stamped with the fleet's logo, CLBR, have been found (Figs 13.5 and 13.6). These were at Beauport Park, at Bardown, at a port on the south bank of the River Rother at Bodiam, at Little Farningham Farm, near Cranbrook, which is adjacent to the Hastings-Rochester Roman road, and most recently at another probable port site at Kitchenham Farm, near Ninfield. Roofing tiles imply the presence of one or more buildings, which in turn imply a permanent presence by the fleet at those sites where they have been found. As the fleet was primarily a transport organisation it might be reasonable to assume that the sort of building it erected at a site would be connected with that role, such as an office or a warehouse. This was probably the case at Bardown, where the foundations of timber buildings were excavated. At Cranbrook there was evidence of small but more robust buildings but the location of the tiles did not necessarily imply their use thereon. At Bodiam, as at Bardown, a timber building was noted. As excavations at Kitchenham are still in progress, no conclusions can be drawn there as yet. The only type of building certainly known to have been roofed with the fleet's tiles is the bath-house at Beauport Park (Fig. 13.7).



Fig. 13.6: Detail of a Classis Britannica stamped tile from Beauport Park (photograph: author).

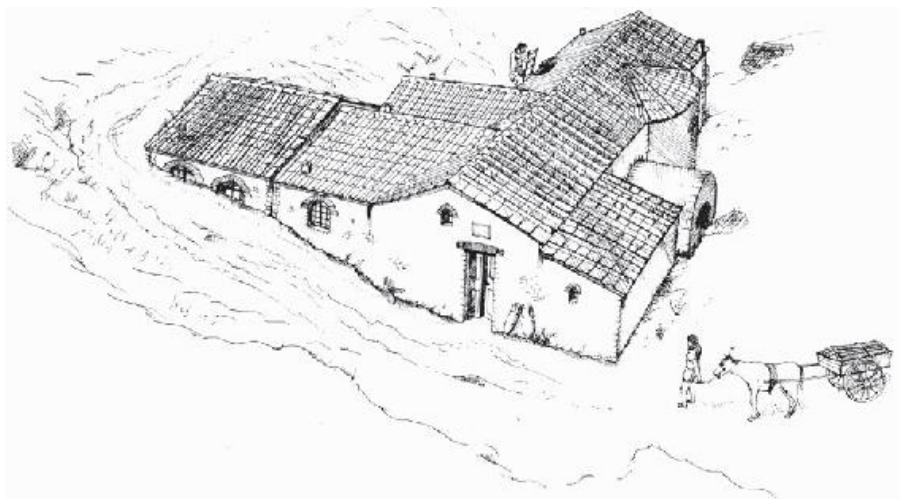


Fig. 13.7: Reconstruction of the bath-house, Beauport Park (drawing: G. de la Bédoyère, from Brodrigg and Cleere 1988, 235; ©Cambridge University Press).

The use of tiled buildings at all of these sites, with the exception of Beauport Park, is consistent with the fleet having some sort of presence in association with the procurement or transportation of iron. Even as far inland as Bardown or Cranbrook it is very possible that the fleet would have had the means and motive to move the iron

products of the surrounding areas to a transshipment point, probably Bodiam. Thus far, the fleet's role may have been largely concerned with supply, but the ten-room bath-house at Beauport Park was a fleet building and must have been constructed for the fleet's personnel. A permanent presence on that scale implies far more, not only at Beauport but at the other sites mentioned. For the fleet to have as many staff on a site as would merit a bath-house on the scale of that at Beauport the implication is that it was directly concerned with the sourcing, and therefore the production, of iron, and not only at Beauport itself but at sites within a day's return journey. The large sites in the vicinity of Beauport – Oaklands and Footlands, both near Sedlescombe, Crowhurst Park and nearby Fore Wood, and Chitcombe near Brede – are all in that category, and the limited or lack of excavation on those sites has done little to produce direct evidence of fleet involvement. Furthermore, the shortage of dating evidence at some of those sites, and at Beauport in particular, after the middle of the 3rd century, which coincides with an apparent change in the fleet's organisation, reinforces its connection with iron production.

We cannot be certain that the fleet's role at all the iron-related sites where its presence has been confirmed was the same. Although more iron-production activity has now been proved at Little Farningham Farm, south-east of Cranbrook, than was apparent when it was excavated in the 1950s, the full extent, which may cover as much as 1.5ha, has yet to be revealed (Aldridge 2001). Situated beside the Roman road between Rochester and Bodiam, finds have included window glass, painted wall plaster, *opus signinum* and samian ware, indicating a high-status establishment. Apart from the ironworking on-site, hardly any bloomeries have been discovered within a radius of 5km, which suggests that iron was not the main reason for the fleet's presence there. Was this, instead, a roadside station, with the iron production traffic-related? One might normally expect such a facility to be located at a road junction, but the nearest lies more than a kilometre to the south. The source of the clay for all of the CLBR tiles found at Little Farningham has been traced to the Ashdown Beds between Fairlight and Guestling, north-east of Hastings (Peacock 1977), so they would have been carried from there. The purpose of the fleet presence there is not at all clear.

There seems little doubt that iron production underpins the fleet's presence at Bardown. Even so, this is an inland location typically sited above the banks of a stream. Cleere's excavation of the 1960s noted

the substantial slag heap and uncovered evidence of at least one building and more than 20 CLBR tiles (Cleere 1970, 2–11). Subsequent geophysical surveying has shown that the working area that Cleere did not locate was sited to the north-east of the habitation (David Staveley, pers. comm.). The production of iron is a plausible reason for the presence of fleet tiles at this site, but what it was about Bardown that attracted the fleet, as opposed to another site of a similar scale, will probably never be known. What is evident in the area around Bardown that is not the case with that at Cranbrook is the presence of other contemporary production sites. Cleere has shown that Bardown could have been a hub for iron produced in the district (Cleere and Crossley 1995, 33), and this could have justified the fleet's presence there. The River Limden, the stream that flows past the site, is a tributary of the Eastern Rother, which flows past Bodiam on its way to the sea. For heavy materials such as iron, water transport would always be preferred, so a route for the site's products that made use of the fleet's mode of transport will have been likely to have involved the River Rother. The Limden was probably never wide or deep enough for transportation in the vicinity of Bardown but nearer its confluence with the Rother it is possible that there was a break-of-bulk point for products to be transferred from land transport to water. Margary identified a ridgeway north-east of the Limden that ran through Ticehurst and Wadhurst, and it seems probable that a similar route existed on the south side, passing from Shover's Green through Stonegate (which may mean stone street) in a south-easterly direction. The recently discovered enclosure with associated Romano-British pottery at Burgham Down (David Staveley, pers. comm.), lies close to where this ridgeway descends to the Limden, a short distance from the Rother at Etchingam (Fig. 13.8). Could this have been where products from Bardown were assembled before being put onto barges for onward movement to Bodiam about 10km downstream? The potential for such an arrangement may mean that other sites on tributaries of the Rother could have had their products shipped to the fleet's port at Bodiam. That there was movement down the Rother in the Roman period is also suggested by occupation debris and samian ware found on the west bank of the river upstream from Robertsbridge, though no actual site has been found (Martin 1973).

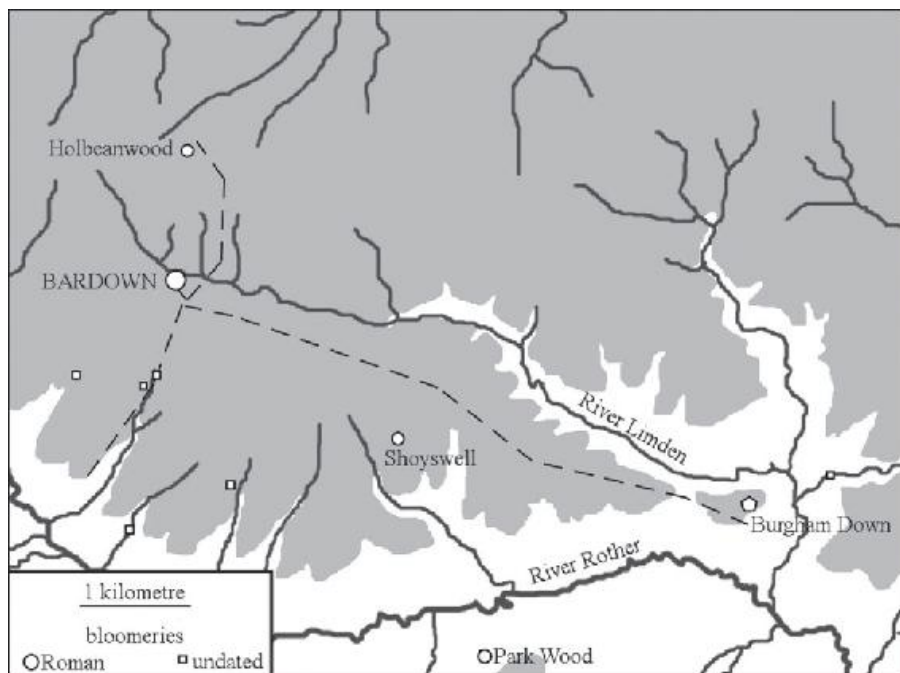


Fig. 13.8: The area around Bardown ironworking site, near Wadhurst.

The presence of the fleet deep in the High Weald at Bardown begs the question as to how far its interest extended. Cleere proposed that the organisation of iron production was split between a maritime group, potentially under fleet control, and a central Wealden group, whose main transport routes were along the road system established after the conquest, and which perhaps operated on the basis of concessions granted to native iron makers. But Bardown is geographically in that central group, and the newly discovered fleet presence at Kitchenham, beside Waller's Haven, a former arm of the sea, opens up the possibility that the fleet was interested in a wider area than earlier supposed.

The majority of ironworking sites in the Weald dating to the Roman period have been found in the centre of the region, though the archaeological interest paid to that part may be a factor in that density. A wide range of sizes of site have been identified, with a corresponding range of inferred outputs and, although this area of the Weald does not have as many of the very large sites as seen in the south-east, the occurrence of samian pottery on some sites, and no less widely distributed, may be an indication that the authorities were every bit as much involved in this part of the region as they were further to the east. At Garden Hill the building of a bath-house in the 2nd century clearly marks the site as having a role as an outpost with

sufficient staff who used the place as a base to merit some luxury (Money and Streeten 1981). The finding of a hypocaust tile at the bloomery at Morphews, near Buxted, and of window and vessel glass, mortared stone and a variety of pottery types at Howbourne, little more than 1km away, suggests more permanent establishments there also. Samian ware has also been found at three bloomery sites in close proximity clustered around the upper Medway valley to the south of East Grinstead, at Ridge Hill, Standen and Walesbeech. At the last of these, imported pottery also implies a higher status of occupation than merely iron smelting.

The organisation of the central group of sites will remain a matter for speculation. The roads across the Weald, particularly that between Barcombe and London (Margary 1973, route 14), and to a lesser extent the route north from Hassocks (Margary 1973, route 150), would have been crucial in moving iron products to their markets. The distribution of sites to the east of the first of these routes, notably in Mayfield and Rotherfield parishes, begs the question as to whether another trans-Wealden road existed, perhaps linked to the Greensand Way near Arlington, where a Romano-British settlement has recently been discovered (Chuter forthcoming).

The distribution of known bloomery sites from the Roman period has inevitably been subject to the varying intensity of archaeological fieldwork. The area of the central High Weald studied by the Wealden Iron Research Group in the 1970s (Tebbutt 1981) identified 246 sites of which 16 per cent were dated. Of those, 82 per cent were from the Roman period. Subsequent research in the same area, by which more sites have been both discovered and dated, has revised the last figure to 71 per cent. This compares to 62 per cent of dated bloomeries over the whole Weald. As discussed above, the vast majority of those sites would have been small, short-lived operations existing only as long as a local source of ore could sustain them. The major production sites in the central Weald are not evenly distributed geographically but the most significant of them are the ones that have attracted the most attention: Oldlands and Great Cansiron. Of a similar extent to Oaklands Park and Crowhurst Park in the south-eastern Weald, both lie within 2km of the Barcombe-London road, which was metalled with iron slag over more than 15km of its length. It can be expected that these two sites supplied significant amounts of slag to its construction. Both were in operation by the end of the 1st century, Cansiron continuing in production through into the 2nd, while coin

evidence has Oldlands still working in the reign of Diocletian, early in the 4th century. As was the case with Oaklands and Beauport, Oldlands came to attention because of the quarrying of its slag heaps for road metalling in the Victorian period, and as a consequence being the first of the major Roman sites to be described in some detail.

Great Cansiron has been the subject of a recent geophysical survey which has revealed that a track ran through the site in an east–west orientation (Russell and Staveley 2012). The working area was subdivided into several irregularly sized plots and the outlines of buildings are evident. It is also clear that the working area probably extended further to the west than the survey was able to show. A distinct boundary to the site is evident on the north and east sides, and earlier fieldwork identified that the ground to the north of the workings is liable to flood in wet weather. If the water table had been high enough in the Roman period, it is possible that some water transport may have been feasible for the movement of products. Potential ore sources for these works have been identified in Tugmore Shaw and at Puckstye, both about 1.5km distant, where there are large quarries into the Wadhurst Clay (Swift 1982). A high proportion of the material excavated with the iron ore was clay which attracted other industry to the Cansiron area in the Roman period (Fig. 13.9). About 700m east of the ironworks a tile kiln was in operation during the same period as the ironworks (Rudling 1986). Tiles from this operation were used as far afield as Essex, Hertfordshire and Hampshire, with proximity to the Barcombe-London road affording access northwards. It is likely that *Classis Britannica* tile production, identified as having taken place in the Guestling and Fairlight district near Hastings, would have taken similar advantage of the routeways serving that area, although no actual production sites have been identified. The combination of a labour force, wheeled vehicles and the roads on which they would be used made the concentration of different industrial processes in a single location as economically sensible as modern industrial areas.

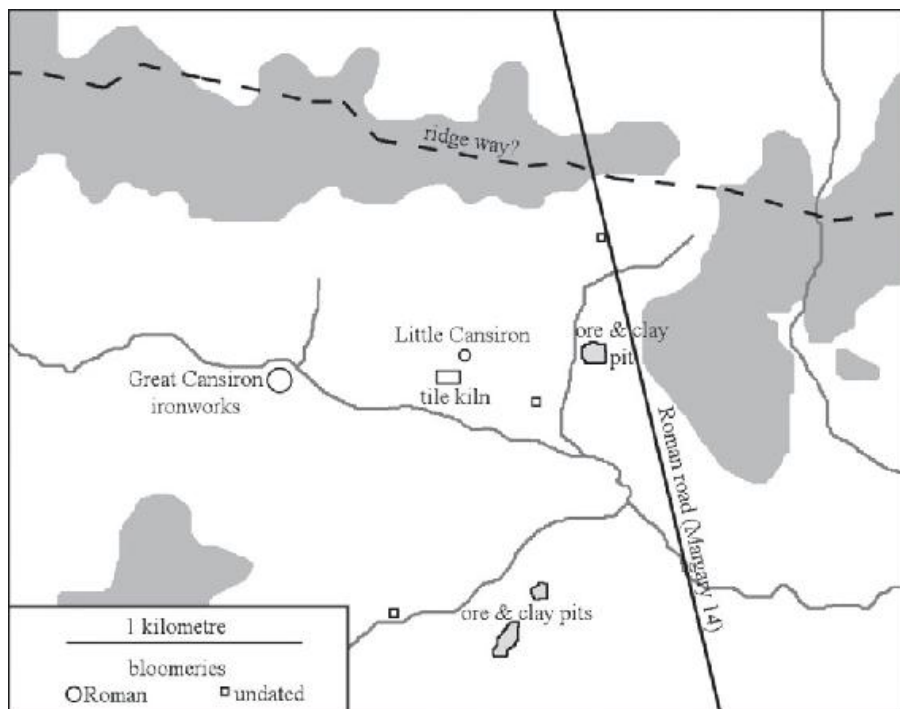


Fig. 13.9: The area around Great Cansiron ironworking site, near Hartfield.

The destination of the three north–south Roman roads traversing the iron production area of the Weald was London, or more precisely Southwark. The Hassocks road and the Barcombe road both connected with the Greensand Way (Margary 1973, route 140) which linked Chichester and Pevensey, so some movement of traffic would have taken advantage of that connection and small amounts of iron for local trade and consumption would undoubtedly have headed south. The Greensand Way passed through an agriculturally fertile and prosperous region with many villas and farms generating a modest demand for iron. Small quantities of forging slag discovered at such sites indicate there would have been facilities for working up iron smelted in the Weald.

Margary linked the construction of the Hassocks and Barcombe roads with the need to transport corn from the South Downs to London (Margary 1973, 59), but in the case of the latter the movement of iron must have been at least as important. Most of the iron sites close to the Hassocks road, which include those at Ridge Hill and Walesbeech, and possibly Broadfield, are found within reach of a relatively short section of the road between Ardingly and Blindley Heath (north of East Grinstead) where slag was used for road

metallurgy. This suggests that, as Margary (1965, 93) postulated, the transport of iron was possibly not the road's primary purpose. The Barcombe road was different. Apart from the considerable length of iron slag metallurgy, stretching from Isfield, in the south, nearly to Edenbridge in the north, the dating of the road very much coincides with the expansion of the iron industry in the late- 1st and 2nd century (Margary 1965, 125). The road that branched off Watling Street at Rochester (Margary 1973, route 13) and headed southward towards Bodiam and the group of large ironworks beyond was probably also largely planned for the movement of iron. With the *Classis Britannica* active at its southern end, shipping iron from wharves at Bodiam and possibly Sedlescombe, it is unlikely that most of the metal produced in that district would have been taken northwards, however, as with the Greensand Way and its connections with the Hassocks and Barcombe roads, a domestic market for iron, in this instance in the prosperous area around Maidstone with its many villas and farms, is likely to have been supplied along this road.

The roads themselves may have generated some iron production. It was a significant activity in the settlement that was excavated at Westhawk Farm, near Ashford (Paynter 2008). The site lies at the periphery of the Low Weald and made use of ore brought from just beyond its margins, so it is unlikely that production at that site was contributing to the overall output of the region. Instead, its location on the east-west road between the Weald and Canterbury (Margary 1973, route 130), close to the greensand route from south of Maidstone to the fort at Lympne and on to Dover (Margary 1973, route 131), makes its function probably related to the needs of road traffic and to the service of the agriculture in the district. A similar function may have applied to the roadside settlements at Wellingham, by the River Ouse, near the junction of the north-south route (Margary 1973, route 14) and the Greensand Way (Margary 1973, route 140), and at Arlington, close to the River Cuckmere crossing on the road between Barcombe and Pevensey (Margary 1973, route 142), at both of which sites there is evidence of ironworking (David Millum, pers. comm.; Chuter forthcoming). Again, there is proximity to one or more road junctions and the additional consideration that at Pevensey Castle, the late Roman fort at the eastern end of this road, a few *Classis Britannica* tiles have been found (Salzman 1908, 112), suggesting a fleet presence at that site, although the date of the stone fort falls after the active period of the fleet in relation to the iron industry.

While the three north–south routes described above all eventually converge on London, the Barcombe road can be seen as the principal route for the transportation of iron from the Weald. An extensive metalworking facility discovered at the former Courage Brewery site in Southwark is likely to have been the destination for much of this traffic (Hammer 2003, 166–7). London, which replaced Colchester as the provincial capital, would have consumed considerable quantities of iron for building and for domestic articles. It may be significant that relatively little evidence of the forging of iron has emerged from excavations at the smelting sites in the Weald. Finds of forging slag at settlement sites beyond the margins of the region indicate that unconsolidated blooms were being worked there and that basic consolidation was not always taking place where the blooms were smelted. This might seem an inefficient practice, but it may indicate that smelting sites only had a small workforce and needed to conserve charcoal supplies, and that where forging did take place, such as at Cow Park, Hartfield (Tebbutt 1979) and Smythford, Worth (Hodgkinson 1985), it was for a local need. The site at Southwark became active at the end of the 1st century with the number of hearths associated with ironworking reaching a peak between the 3rd and mid-4th centuries. This chronology is at odds with perceived iron production in the Weald. Much of this decline, particularly at the large sites in the south-east of the Weald, may be attributable to the change in function of the *Classis Britannica* at that time. However, two of the large sites in the central Weald which were closer to, and could have continued to supply the works at Southwark – Oldlands and Broadfield – continued in production into the 4th century.

The iron shipped out of the south-eastern Weald by the *Classis Britannica* was likely to have been destined for more distant markets. The demands of the military on its campaigns in the further reaches of the province could be served by the fleet, and evidence exists of the fleet's involvement in the construction of a section of Hadrian's Wall (Adler 2013, 111–12). Unfortunately, metallurgical science has yet to come up with a way of determining the provenance of forged iron so a Wealden origin for iron artefacts, such as the domestic implements typically unearthed at villa sites, or the huge cache of nails found at the legionary fort at Inchtuthil in the Grampian Mountains of Scotland, remains speculative.

An imperial estate?

Cleere has argued that an imperial estate may have been established in the Weald (Cleere and Crossley 1995, 66–9). The main criteria he put forward are the vesting of all mineral rights in the imperial *patronium*, and the absence of early villas and nearby towns suggesting an area reserved for a particular activity. The apparent concentration of the activities of the *Classis Britannica* in the eastern Weald led to his view that organisation of iron production was divided between the fleet in the east and a civilian leasing system in the west. An inscription found at Chichester that refers to a *collegium fabrorum*, or smiths' guild, has been suggested as relating to the organisation of production as far to the east as Hastings, but it is difficult to see how such a connection could be manageable at such a distance. Furthermore, the limited evidence of smithing found at Wealden sites makes such a guild more appropriate in an urban centre such as Chichester, where smiths' shops would cater for domestic needs and those of the agricultural hinterland. The discovery of a fleet presence at Kitchenham Farm, Ashburnham, taken in conjunction with the finding of CLBR tiles at Pevensey, hints at its involvement with iron production further to the west. And while the sites at Beauport and Bardown ceased operation in the mid-3rd century, such early closure was not only confined to fleet sites; pottery evidence suggests that production at the large works at Great Cansiron, in the north of the High Weald, was similarly curtailed. However, the central Wealden site at Oldlands, the western site at Broadfield and the coastal site at Footlands all appear to have continued working into the last century of Roman occupation. One might expect some zonal operational consistency if the Weald had been so organised.

The complete absence of evidence for iron production in the period following the withdrawal of the Roman army at the beginning of the 5th century suggests that the early closure of some ironworks might have been for more than just the reorganisation of the role of the *Classis Britannica* (see also Scott, this volume). Were ironworkers redeployed to other regions in the province?

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Chapter 14

Ironwork and Its Production

Ian Scott

Introduction

‘Dans cette Europe occidentale, le travail du métal est en effet la technique par excellence: c’est la matière la plus dure à extraire, celle qu’il faut arracher aux entrailles de la terre et œuvrer ensuite à l’aide du Feu, par le travail le plus pénible; tout objet de métal est une véritable conquête de l’homme, la forge est pleine d’une atmosphère magique qui survivra surtout dans les légendes germaniques, et le forgeron est le seul artisan, chez les Méditerranées comme chez les Celtes et les Germains, qui ait sa place au rang des dieux’. (*Duval, 1952, 44*).

The Wealden iron industry is the subject of a separate chapter by Jeremy Hodgkinson and therefore the subject of this chapter is (1) the ironwork found on Roman sites and in particular the new forms and types of iron tools and implements introduced by the Romans, (2) the archaeological evidence for smithing, the organisation of smiths and the production of ironwork and (3) any evidence for the existence of specialist smiths in the South-East in the Roman period.

Smithing was a fundamental trade providing many of the tools for a whole range of other crafts as well as supplying domestic iron fittings and utensils, fixtures and fittings for buildings and carts and wagons, and also providing maintenance and repairs. While the practical importance of smithing cannot be over-emphasised there is another aspect of it which must be mentioned. Aldhouse Green (2002, 15–16) has argued that the process of iron smithing is fundamentally different from working in other metals and that it is this that sets blacksmiths and ironwork apart and ‘imbued them with awe, mystique and fearful respect’. Hingley (1990, 110) has suggested on the basis of ethnographic evidence that ironworking can be highly ritualised and the smith a figure on the margins of society. He argues that ironworking is ‘a mystical and highly-charged process’ (Hingley 2006, 217). Perhaps relevant here are the iron spiral mounts probably from a sceptre that were found in excavations on a ritual site at Frensham, Surrey (Bird 2004, 160). The mystique surrounding smiths may

account for the late Iron Age and Roman images of smithing tools and of smiths. There are pottery vessels with applied images of smiths' tongs, hammers and anvils from Southwark (Dennis 1978, 369, fig. 166, no. 1273) and Sturry Road, Canterbury (see <http://www.canterbury.co.uk/museums/roman-museum/Roman-everyday-life.aspx>) and also from Colchester (Toynbee 1962, 191–2, cat. no. 162, pl. 191; Hull 1958, 144, no. 2, fig. 57, no. 2). The pot from Southwark was decorated *en barbotine* and was found in a well. The well and two adjacent pits contained the remains of 20 dogs (Drummond-Murray and Thompson 2002, 97). Dogs were sacred to the Celts and also were associated with Sucellus the Celtic 'mallet god'. The bronze sceptre binding from the Farley Heath Romano-Celtic temple, Surrey has images of smith's tongs and a hammer, and a probable sun wheel (Bird 2007, 47, figs 19–20). There is also a figure that might be Sucellus the 'mallet god' with his hammer (Goodchild 1938; Goodchild 1947). The evidence from Roman Britain for the smith god (Leach 1962) is further testimony to the importance attached to smiths and ironworking.

The importance of ironworking and the symbolic weight given to iron products (*cf.* Aldhouse-Green 2002, 8–12) and in particular to tools and weapons, is illustrated further by the ritual deposition of substantial quantities of ironwork during the late Iron Age and Roman period (Manning 1972a; Haselgrove and Hingley 2006; Hingley 2006). Interestingly this activity seems to have been mainly practised in Wessex and the Severn-Cotswolds with a scatter across Wales, the Midlands and East Anglia and a small number of deposits in the north on the east coast and in southern Scotland. With the possible exception of Bigbury, there is a notable absence of large deposits of ironwork in the south-east counties (Haselgrove and Hingley, 2006, fig. 3; Hingley 2006, appendix), and it has been argued for Bigbury that the various finds of ironwork made during quarrying in the 19th century came from hoards (Manning 1972, 228, 230). The distribution of metalwork hoards is similar to the distribution of hoards of Iron Age currency bars, which are absent from the south-east counties (Haselgrove and Hingley 2006, fig. 1).

Iron Age to Roman Britain

It is generally agreed that iron was more extensively exploited and iron objects more widely available in Roman Britain by comparison with pre-Roman Iron Age Britain, through the expansion both of the

exploitation of ore sources and of the production of ironwork (cf. Manning 1979, 111–12). In the Iron Age iron was used for numerous craft tools, for spearheads and swords, for slave chains and firedogs and tyres of chariots or carts. Iron was not used for structural fittings or nails. The iron anchor and anchor chain from the Bulbury, Dorset hoard (Cunnington 1884, 117) should also be mentioned in this context, although this may be evidence for trading contacts and may have originated from Brittany.

Clough (1986, 219) has argued that iron was more extensively and intensively exploited in the Iron Age than is generally suggested. He believed that the use of iron for slave chains, such as those from Bigbury (Thompson 1983, 274, nos 46–51, fig. 16, nos 28–9 and pl. 37b; fig. 18, nos 45–8 and pls 37a and c, and fig. 19, no. 54), shows that iron was ‘abundant and cheap’, and that the hoarding of currency bars indicates that production of iron was ‘in excess of local requirements and trade’, but neither of these arguments is truly convincing. Slave chains served to control a very important trading and exchange commodity in the form of slaves, and arguably the value of the chains lay much more in this fact than in the material from which they were made. Also of relevance is the fact that control of the trade in slaves lay with the elite. It is possible also that these chains were used to shackle sacrificial victims (Aldhouse Green 2002, 11). Clough’s suggestion that the burial of large numbers of currency bars in hoards indicates a surplus of iron ignores Hingley’s argument (1990, 98–103, 109–11) that the burial of currency bars often at boundaries may well have had a symbolic element related to the fact that currency bars represented an intermediate stage in the iron-making process, that they were neither natural ore nor finished object but between the two states.

Although the numbers of iron objects being made were increasing and more large objects such as fire dogs appeared in the later pre Roman Iron Age (Manning 1979, 116), the greatly increased use of iron after the Claudian invasion is nonetheless marked and the range and variety of iron objects from Roman sites is greater than from Iron Age sites.

The evidence of bloomery sites supports this generalisation of increased iron use in Roman Britain. The expansion of iron production in the south-east is most obviously shown by the increase in numbers of bloomery sites operating in the Weald. Production seems to have begun on many bloomery sites within a few years of the Claudian

invasion in AD 43 and certainly before the end of the 1st century (Cleere and Crossley 1985, 56–7, fig. 20; Hodgkinson, 2008, 30–1, fig. 16, compare fig. 15 and see also this volume). Not only were there many more bloomery sites in production than in the Iron Age, but the scale of the operations and output of some sites was much greater than in the Iron Age.

The presence of a large army of invasion with requirements for food and fodder and other necessities undoubtedly had a major impact on the south-east of England, even after the army moved north and west on campaign. The army would have required as well not only the repair and replacement of damaged arms and armour and the maintenance of carts and wagons but also leather in large quantities for tentage, boots and shoes and other uses (Keily and Mould, this volume), and later on structural ironwork and timber for fort construction. It is arguable that the initial increase in the exploitation of iron sources and the expansion of production after the Claudian invasion was generated in large part by the needs of the invading Roman army. The Roman legions included in their ranks smiths, as well as other craftsmen, such as carpenters and stone cutters. Such a soldier craftsman was Iulius Vitalis a *fabricie(n)sis leg(ionis)* in *Legio XX Valeria Victrix* who was buried at Bath probably in the later 1st century (RIB 156). While some of the forging and smithing, particularly for repair and maintenance of equipment, will have been undertaken by craftsmen in the legions it is certain that more work was required than they could deal with, and it is likely that local smiths could have been employed as occasion demanded. The demand for iron products would undoubtedly create a need for increased iron production.

Tools, implements, fixtures and fittings

Once the army had move westward into Wales and north into the Midlands and beyond, other sources of iron on the Jurassic Ridge (Schrüfer-Kolb 2004) and in the Forest of Dean would have been accessible. The sustained expansion of iron production after the initial conquest period, with more bloomery sites being opened up in the 2nd century, can be explained best by an increased demand for ironwork of all types as a consequence of new patterns of consumption amongst elements of the native British population.

Craft tools

For some crafts the tools available in the Iron Age and Roman period

differed little, but for other crafts more extensive suites of tools with new tool types came in with the Roman occupation. New building techniques, new crafts such as cabinet-making, masonry and glass-making required a wider range of tools and more tools.

There is little difference between the suites of basic smithing tools – hammers, anvils, tongs and pincers, chisels and sets – available to Iron Age smiths and those available to Romano-British smiths. The difference was the scale of the exploitation of the resource under Roman rule and the organisation of the industry. A number of smith's tools, including a hammer, a punch, chisel or set and an awl were recovered from middle to late Roman contexts in Zones 20–21 of the East Kent Access road (Scott 2015, 103–4, nos 1–4, fig. 3.10, no. 1) (Fig. 14.1, 2). The nearby site at Monkton produced a metalworking hammer (Macdonald *et al.* 2008, 213, fig. 2/63, no. 2454). On another part of the East Kent Access road scheme a hooked billet was found in a posthole of middle Roman date (Scott 2015, 59, no. 51, fig. 3.3, no. 51). A metalworking hammer was found at Lullingstone in association with a possible mower's anvil (Meates, 1987, 95, fig. 43, nos 38–9). Examples of metalworking tools were found at the late Roman site at Ickham, Kent (Mould and Riddler 2010, 289–91, figs 119–20). A smith's hammer has been identified from excavations in Stoney Street, Southwark, which form part of the Thameslink project currently being prepared for publication. The hammer was found adjacent to two probable 1st-century smithies identified from ironworking debris.

There is little to distinguish leatherworking tools – slickers, lunate knives, awls, punches and needles (see Keily and Mould, this volume) – from Iron Age sites from those from Roman contexts. Examples of leatherworking tools were recovered from the late Roman site at Ickham, Kent (Mould and Riddler 2010, 293–5, fig. 121), and other examples came from Romano-British sites on the East Kent Access road (Scott 2015, 59, nos. 41 and 43, fig. 3.3, no. 41; 64, no. 114, fig. 3.4, no. 114; 104, nos 6–7, fig. 3.10, nos 6–7) (Fig. 14.1, 3–5). The latter included a lunate knife, two small leaf-shaped knives, an awl and a needle.

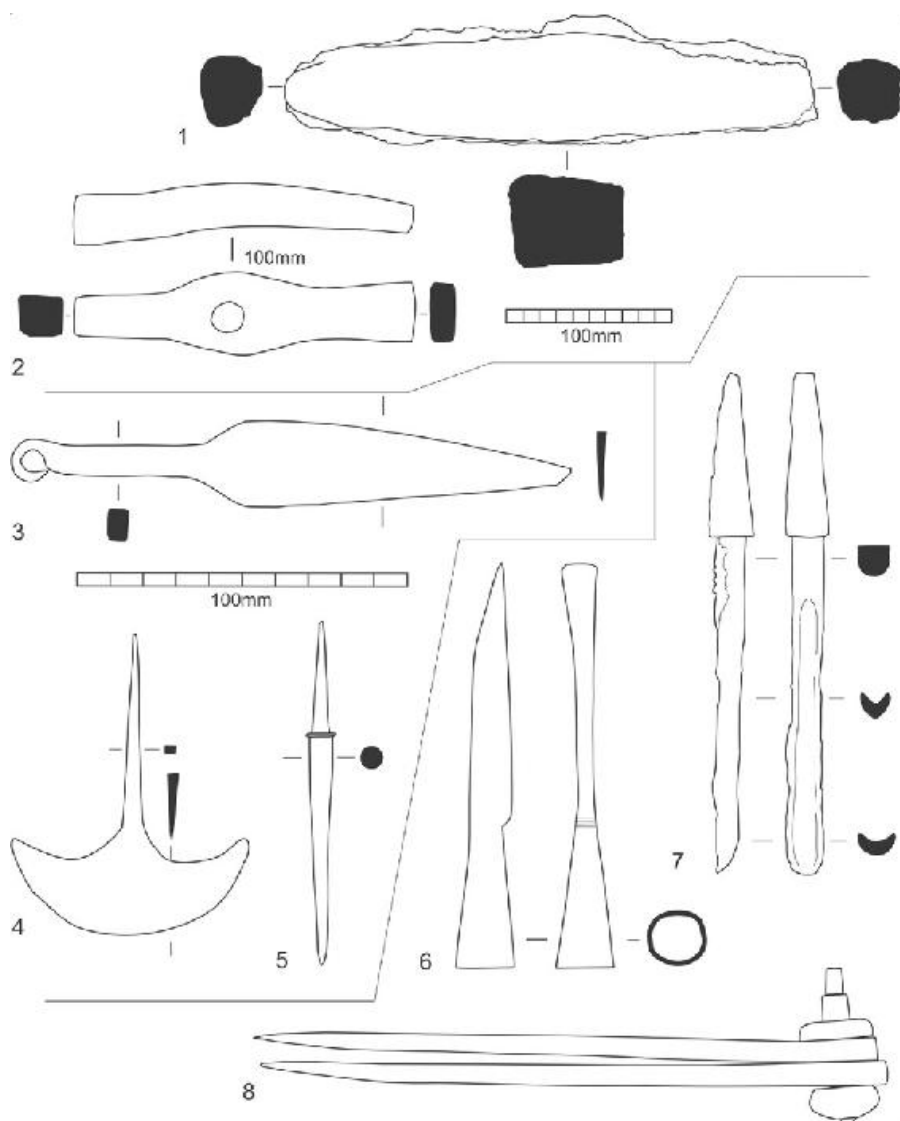


Fig. 14.1: Smithing - Iron billet (1), smith's hammer (2). (Scale 1:4). Leatherworking - lancet (3), lunate knife (4), awl (5). (Scale 1:2). Carpentry - small mortice chisel (6), spoon bit (7), dividers (8). (Scale 1:2). (Images: (1) Westhawk Farm, after Scott 2008, fig. 5.10; (2)–(6) East Kent Access, after Scott 2015, figs 3.3, 3.7, 3.10; (7) Springhead, after Schuster 2011, fig. 114; (8) East Kent Access, drawing: author (Scott 2015, 59, no. 44 (not illustrated)).

The scale of the leather production and its organisation is one aspect that distinguishes the Roman from the pre-Roman leather industry. Another key fact is that vegetable tanning was introduced to northern Europe and Britain by the Romans (van Driel-Murray 2001;

van Driel-Murray 2002). The requirements of the Roman army of invasion for tentage, boots and shoes and other leather products must have been enormous (Fig. 11.2). The supply of hides for tanning – as of bone and horn – must have been very much tied in with the supply of meat.

Woodworking in all its manifestations – felling, logging, carpentry, and joinery – is another craft that would have seen an increased demand after the Roman invasion. A wide range of woodworking tools was available during the British Iron Age and included saws, axes and adzes, chisels and gouges, draw knives and shaves, and augers. There were certainly compasses and drills also available to Iron Age carpenters.

Most of the woodworking tools used in the Roman period were similar to those used in the Iron Age but with some minor differences and additions. For most of the Iron Age socketed axes were used, although the shaft-hole axe was introduced in the late Iron Age and there is an example of the latter from Bigbury, Kent (Thompson 1983, 265, no. 20, fig. 14 no. 15, pl. 34a). The Romans seem to have introduced a distinctive adze-hammer (Manning 1985, 17–18, pls 1, 8–9, B14–16; see also Jansma and Morel 2007, 228–30, figs 8.52–3); a fragmentary example is known from Ewell, Kent (Manning 1985, 18, pl. 8, B15) and an almost complete example from Lullington (Meates 1987, 95, fig. 43, no. 237, incorrectly identified as a claw hammer). The form is replicated in a model adze hammer amongst a group of votive models said to be from a tumulus in Sussex (Manning 1966, 57, fig. 2, a).

During excavations on the East Kent Access road, South Thanet in 2009–2010, a carpenter's draw knife with curved blade and a rod tang at each end was found in the fill of a Roman ditch (Scott 2015, 58–9, no. 40, fig. 3.3, no. 40; cf. Ulrich 2007, fig. 3.10 for the form) (Fig. 14.2, 10), and part of a small handsaw of Iron Age or Roman type from an early Roman context (*ibid.*, 58, no. 35). A socketed mortice chisel, a large tanged paring chisel and a pair of dividers were also recovered (*ibid.* 76–7, no. 1, fig. 3.7, no 1; 104, no. 5, fig. 3.10, no. 5) (Figs 1.6–8; 2.9). Two drill bits were recovered from excavations at Springhead in advance of the construction of the Channel Tunnel Rail Link (HS1) (Schuster 2011, fig. 114) (Fig. 14.1, 7). Examples of woodworking tools were recovered from the late Roman site at Ickham (Mould and Riddler 2010, 293, fig. 120).

The saws available in the Iron Age were all small handsaws

(Darbyshire 1995, 407, figs 59–65, see examples from Bredon Hill, Glos: Hencken 1938, 78, fig. 9, no. 1; Glastonbury, Somerset, a well-preserved saw complete with its wooden handle: Bulleid and Gray 1917, 371, pl. 60, I53; see also pl. 61, I1 and I52; and Danebury, Hants: Sellwood 1984, 351, fig. 7.11, nos 2.42–3, Cunliffe and Poole 1991, 342, fig. 7.12, 2.29–41). After the Roman conquest a number of different types of saws were available to the woodworker including keyhole saws or small handsaws, band saws, bow saws, frame saws and pit saws (Gaitzsch 1980, 190–8, Abb. 34–5; Ulrich 2007, 45–51, figs 3.33, 3.35, 3.37–40).

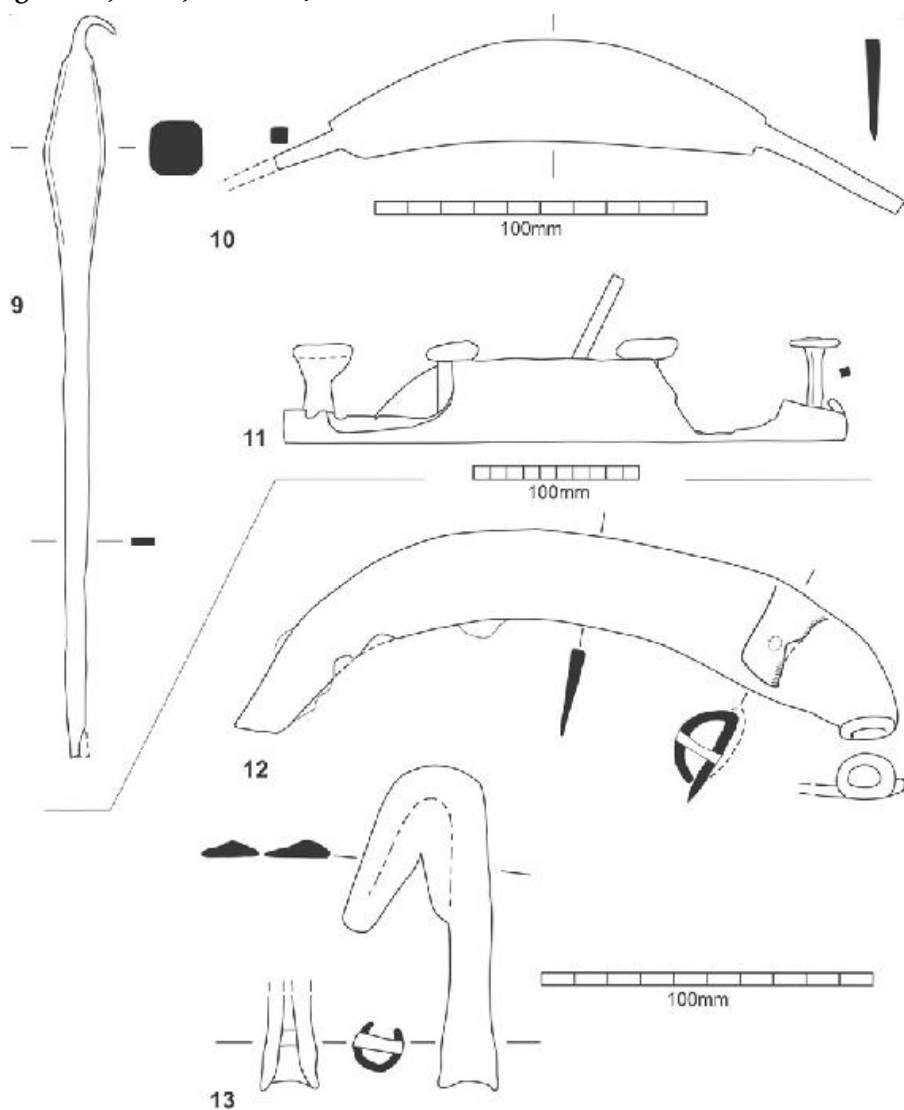


Fig. 14.2: Carpentry – paring chisel (9), draw knife (10). (Scale 1:2). Plane (11; scale 1:4). Agriculture – scythe (12; scale 1:4), pruning hook

(13; scale 1:2). (Images: (9–10) and (12) East Kent Access, after Scott 2015, figs 3.2, 3.3, 3.10; (13) East Kent Access, drawing: author (Scott 2015, 103 (not illustrated)); (11) Silchester, after Gaitzsch and Matthäus 1981, fig. 36).

There are two models of frame saws amongst the group of Roman votive models from Sussex (Manning 1966, 57, fig. 2, d–e) previously mentioned. The group also included a model adze-hammer of Roman type, and two model shaft-hole axes (*ibid.*, fig. 2, a–c). These model saws compare well with complete examples of Roman frame saws recovered from a flat-bottomed barge excavated at De Meeren near Utrecht, the Netherlands (Jansma and Morel 2007, 232–3, figs. 8.58–9). The finds from De Meeren also include examples of a distinctive form of tanged saw sharpening file (*ibid.*, 234, figs 8.60–1; cf. Gaitzsch 1980, Taf.60, no. 295) including an example complete with its wooden handle. A similar file has been identified amongst the Roman finds from Thameslink excavations in Green Dragon Court, Southwark. The woodworking tools found at De Meeren included a shaft-hole axe and handle, four wooden planes and two complete adze-hammers (Jansma and Morel 2007, 222–6, 228–30, figs 8.44–8, 8.52–3) as well as the two frame saws.

One completely new woodworking tool introduced by the Romans was the carpenter's plane (*runcina*) (Manning 2011, 82; Ulrich 2007, 41–5; Gaitzsch and Matthäus 1981). Planes are not common finds and most examples from archaeological contexts in Britain are from larger towns. There are examples of large planes from Silchester (Evans 1894, 151, fig. 18; Gaitzsch and Matthäus 1981, Abb. 36–7) (Fig. 14.2, 11), two examples from Caerwent (Gaitzsch and Matthäus 1981, Abb. 32–5) and an example from Verulamium (Manning 1972b, 166–8, fig. 61, no. 14, pl. La; Gaitzsch and Matthäus 1981, Abb. 30–1). More recently five small planes have been found in a cremation burial of mid- to late 2nd-century date at Turner's Hall Farm, Wheathampstead, Hertfordshire (West 2005, 273). Another recent find is a plane with an elephant ivory stock from Goodmanham on the Yorkshire Wolds (Long *et al.* 2002). This plane was from a late Roman context and was found in a ditch associated with a timber building. It seems unlikely that this tool was made in Britain, and it was probably originally either part of the tool kit of a carpenter from the Continent, or imported from the Continent. From the South-East there are no certain Roman planes but there is a small wooden plane, thought to be Saxon rather than Roman, which was found in deposits overlying the

Roman quayside associated with the Northfleet villa, at the mouth of the Ebbsfleet (Williams 2011; Biddulph *et al.* 2011, 167–8, fig. 3, 24). The plane could possibly be Roman, but is best paralleled by a plane from grave 26 in the Saxon cemetery at Sarre, Kent (Dunning and Goodman 1959).

Tisserand (2011, 889) has suggested that the Roman carpenters and joiners would have required a wider suite of tools than Iron Age carpenters because they were required to produce a wider range of wooden items including household furniture. Although there is limited evidence of surviving timber furniture from Roman Britain, there is no doubt that Roman style furnishings were available and were used. There are metal folding stools such as that from a Roman barrow at Holborough, near Maidstone (Jessup, 1954, 15–16, 22–33, figs 9 and 12, pl. 9; Liversidge, 1955, 31, pl. 38) and metal fittings including legs and ornate mounts and feet for furniture (*ibid.*, pls 37, 39, 42–3). Perhaps more significant are the surviving fragments of furniture – mainly table legs – carved from Kimmeridge shale (*ibid.*, pls 44–54, 57–8). It is likely that similar items made from wood were available (Mols 2007–8, 146). Many of the skills needed for shaping and decorating shale – particularly lathe turning – are similar to those used for making wooden furniture. It is probable that additional carpentry skills were imported initially, but later developed amongst indigenous carpenters and joiners, to meet a growing demand for well-made and finished household furnishings as the elite developed a taste for Roman-style living. Evidence for skilled carpenters and joiners is provided by a copper alloy mitre and try square incised with the owner's name that was found in the Marlowe Car Park excavations at Canterbury (Blockley *et al.* 1995, 1018–22, fig. 430, no. 342). This was an instrument that had been used by a joiner or cabinet maker rather than a general carpenter or mason.

Amongst the new sets of craft tools introduced by the Romans were glass-working and stone-working tools. Although glass beads were made in pre-Roman Iron Age Britain there is little vessel glass and no evidence for the manufacture of vessel glass before the Roman conquest. The evidence for vessel glass manufacture in Britain during the Roman period (e.g. Price and Cool 1991; Price 2003, 85–90; Wardle and Shepherd 2009, 22–9) mainly comprises furnaces, crucibles, waste glass and very occasional moulds. The tools required for glass blowing include blowing irons, pontil irons, shears and pincers and these on their own are not especially diagnostic (Price

Although stone was used and worked by Britons, there is no doubt that under Roman rule the use of stone was at a different level and that as Blagg wrote (1984, 65) Britain experienced an architectural 'revolution' with rectangular buildings constructed in 'dressed stone and brick, with tile roofs, columns, arched openings and vaults.' This was a totally new building tradition with decorative stonework, plastered and painted walls, underfloor heating and mosaic floors. There were also statuary, inscribed dedications, altars and tombstones in stone. Although few certain stone-working tools are known from Roman Britain (Blagg 1976, 152; Manning 2011, 83–4) a pick-hammer from the Mount villa, Maidstone (Kelly 1992, 210, fig. 10, 5) is best understood as a mason's tool for dressing stone.

The presence of inscribed altars and tombstones, decorative stonework and monumental structures indicates that such stone-working tools must have been available as well as craftsmen to use the tools. In the South-East there are excellent examples of decorative stonework from Canterbury, including fragments of columns and capitals, but also including the marble mouldings and veneers (Blagg 1984, 68–71). Perhaps best known is the monument at Richborough. This was encased in Carrara marble and was very probably made by masons brought in specifically for the project (*ibid.*, 71–2). Although the Richborough monument may have been built and decorated by masons from outside Britain, it is clear that by the early 2nd century there were indigenous schools of masons. Fragments of Corinthian capitals from Canterbury belong to a stylistic type that is found in towns across southern Britain, and include examples from Silchester and Caerwent (Blagg 1984, 66–7, fig. 1). The existence of distinctive styles of masonry in Roman Britain (Blagg 1977) suggests that there were Romano-British masons working within the province and developing their own style. Obviously these craftsmen would require specialist masonry tools. Some indication of the types of stone-working tools available in the Roman world can be gleaned from the tools found in the River Saône in association with a Roman bridge pier at Chalon-sur-Saône (Saône-et-Loire) France (Bonnamour 2000, 294–302, figs 16–17). Not only stone-working tools but also other tools and ironwork were required for such a large construction project (*ibid.*, figs 18–21).

Agricultural tools

The ploughs used during the Iron Age and in the Roman period in

Britain were basically bow ards (Manning 1964 56–7; Rees 1981, 10). A copper alloy model plough amongst the votive finds said to be from Sussex (Manning 1966, 55, fig. 1; Rees, 1979, 63, fig. 71, b) illustrates the form of the ard. There are numerous examples of the iron tips of the shares or fore-shares used with ards. Most are flanged but there are some tanged share tips. The distribution of Iron Age and Roman share tips is concentrated in the area to the south-east of a line from the Severn to the Wash with a few examples from the three south-eastern counties (Rees 1979, map 3). Excavations in advance of the construction of the East Kent Access road in 2009–10 produced a long flanged share tip and a smaller but worn short flanged share (Scott 2015, 57, nos 20–1; fig. 3.2, no. 21) (Fig. 14.3, 14). The long share tip was similar to examples from Bigbury (Thompson 1983, 265, fig. 13, nos 1–3, pl. 32a, fig. 19, nos 49–50). There is also a shorter broad-flanged share tip from Bigbury (Rees 1979, fig. 52, b). There are two examples of broader spade-shaped flanged blades from Bigbury (Thompson 1983, 265, fig. 13, nos 4–5, pl. 32b), which Manning (1964, 58, fig. 5, D and E) identified as plough shares, but which Rees (1979, 50) sees as peat spades. Another form of flanged share, this time heavier, broad and pointed was found at Frindsbury, Kent (Rees 1979, fig. 63; Nightingale 1952, 157, pl. 1) (Fig. 14.3, 15) possibly found with a coulter with which it is sometimes assumed to be associated. The Frindsbury share is broadly similar to an example from Bucklerbury House, London (Manning 1964, fig. 5, F; Rees 1979, fig. 62).

The first evidence for coulters dates from the late Roman period, probably in the 4th century and certainly no earlier than the 3rd century. Many coulters, including the examples from Silchester (Manning 1964, 60, fig. 5, a; Rees 1979, 58, fig. 67, a–c) and Great Chesterford, Essex (Neville 1856, 6, pl. 2, 18) come from deliberate deposits or hoards. From the South-East there is a single coulter from Frindsbury (Rees 1979, 56, and fig. 67, d). Most instances of bar fore-shares made completely of iron have been found in association with the coulters (Manning 1964, 60; Rees 1979, 58–9). The association of coulters and bar fore-shares suggests that they were being used with the bow ard (Rees 2011, 93). Also dating to the late Roman period are a small number of asymmetrical shares including an example from Folkestone (Rees 1979, 57, and fig. 64) (Fig. 14.3, 16) and another from the villa at Brading on the Isle of Wight (Tomalin 1987, 72, 76, and 82, F45). It has been suggested that asymmetrical shares may indicate the presence of a mould board to turn the soil as it is cut and

that they were probably used with a heavier plough rather than an ard (Rees 2011, 91–5).

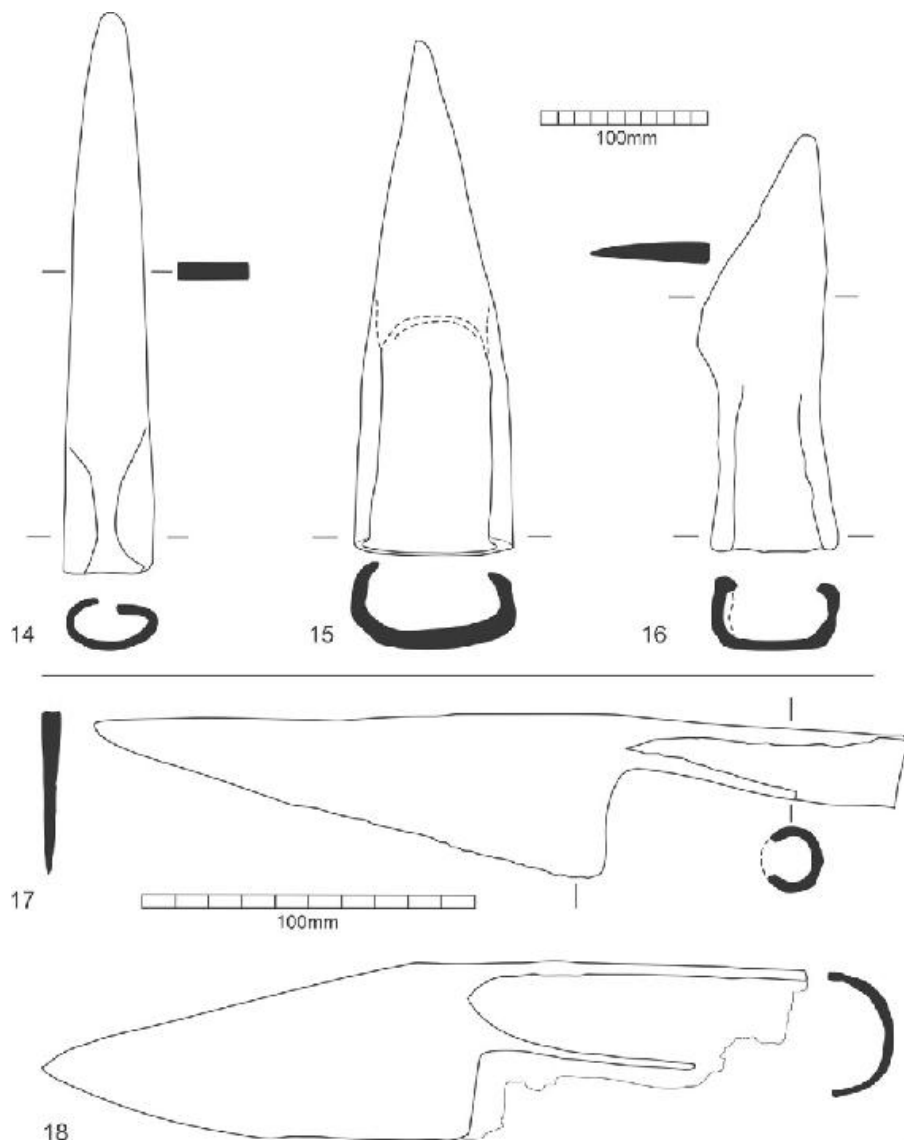


Fig. 14.3: Agriculture – long socketed ploughshare (14), symmetrical flanged ploughshare (15), asymmetrical flanged share (16). (Scale 1:4). Butchery – cleavers (17–18). (Scale 1:2). Images: (14) East Kent Access, after Scott 2015, fig. 3.2; (15) Frindsbury and (16) Folkestone, after Rees 1979, figs 63–4; (17–18) Springhead, after Schuster 2011, fig. 114).

Iron tilling tools – hoes, spades and mattocks – only became common during the Roman period (Rees 1981, 18; Rees 2011, 98). There is a possible mattock from Bigbury (Thompson 1983, fig. 14, no 16, pl. 34a) and from the excavations on the East Kent Access road

comes a spade sheath which is probably Roman in date (Scott 2015, 78, no. 8). The Romano-British site at Monkton on the Isle of Thanet also produced agricultural tools including a spade sheath (Macdonald *et al.* 2008, 215, fig. 2/64, no. 2465).

Roman harvesting tools included reaping and pruning hooks, which were similar to Iron Age tools, and a number of examples were found on the East Kent Access project (Scott 2015, 58, nos 29–31; 77, no. 2; 104, nos 9–11) (Fig. 14.2, 13). Scythes, as epitomised by the 1st-century examples from the fort of Newstead, Roxburghshire (Curle 1911, 284, pl. 62; Rees 1979, 474, and fig. 236, e) seem to have been an introduction to Britain through the Roman military (Rees 1979, 479). There are large sickle- or scythe-like tools from Bigbury (Thompson 1983, fig. 15, nos 19–21, pl. 33a; Rees 1981, fig. 28, a–b) which were probably bills or slashing tools (Rees 1979, 479; Rees 1981, 26). Excavations in advance of the construction of the East Kent Access road uncovered a number of blade fragments possibly from scythes or slashing tools such as those from Bigbury, but also a complete scythe blade (Scott 2015, 57–8, no. 26, fig. 3.2, no. 26) (Fig. 14.2, 12). The blade is 400mm long and is similar to examples from the site of La Tène, Switzerland (Vouga 1923, pl. 14 no. 5; pl. 25 no. 2). It falls into Pietsch's early Type 1 short-blade scythe (*Kurzstielsense*) with blades under 500mm long (1983, 68, Abb. 22) which he states were widely found across the 'Celtic-Germanic culture zone' (*keltisch-germanischen Kulturkries*). It may be that the East Kent Access road scythe blade is of Iron Age origin rather than a Roman import.

Wheeled transport

Wheeled transport was well-developed in the Celtic world as is shown by the many wheeled vehicles used in the Roman world that had Celtic origins and names with Celtic origins (Crummy 2011, 50–2). There is archaeological evidence for Iron Age wheels (*e.g.* in chariot burials: Stead 1991) and a small number of surviving wheels or wheel elements including those from Glastonbury lake village (Bulleid and Gray 1911, 328, 337–9, fig. 99, X43, figs. 112–13, X65). Surviving Roman wheels have been found in the Roman forts of Newstead and Bar Hill in Antonine contexts (Newstead: Curle 1911, 292–4, pl. 69, no. 2; Curle 1913, 385–6, fig. 1; Bar Hill: Macdonald and Park 1906, 92–4, fig. 34; Crummy 2011, 55). The wheels are similar in structure and form to surviving pre-Roman Iron Age wheels and have turned hubs and spokes, and one-piece iron tyres shrunk onto the felloes.

Wheels were widely represented in Iron Age iconography but the discussion (e.g. Green 1979; 1984; 1986) has tended to concentrate on the symbolic meaning of the images to the exclusion of consideration of these symbols as representations and models of wheels. The association of wheel representations with temples as at Wanborough (Surrey) (Bird 1994, 93–4, figs 24–5, pls 11, 16–18) where a head-dress was found surmounted by a model spoked wheel complete with a clearly delineated hub, shows the importance and power of the wheel symbolism. An Atrebatian coin from Petersfield (Hants) shows a horned head apparently surmounted by a wheel head-dress (*ibid.* pl. 10). Arguably wheel symbols would have had a greater impact if wheeled transport was important in Celtic society. A complete iron tyre of late Iron Age or Roman date was found during work on the East Kent Access road (Scott 2015, 72 no. 1, fig. 3.6). The tyre was found in a hollow way and associated with a small amount of Roman pottery. It was made from two lengths of iron welded together into a single hoop. The existence of Iron Age spoked wheels with lathe-turned spokes and one-piece iron tyres points to the existence of wheelwrights and tyreing smiths and is one area where it can be argued that there were specialist smiths in pre-Roman Britain.

Cleavers, butchers and butchery

Study of animal bone assemblages and in particular of cut marks and other evidence for butchery from sites in Roman Britain has revealed marked differences in butchery practice between Iron Age assemblages and Roman urban animal bone assemblages from Britain. Animal bone assemblages from Romano-British urban sites show proportionally more cleaver marks than knife cuts when compared to Iron Age assemblages and to many Roman rural bone assemblages (Maltby 2007, 64). The distinctive butchery practices of urban assemblages are widely accepted as being derived from Roman military butchery methods (Maltby 2007, 70; Seetah 2006, 115). What the evidence of bone assemblages from Roman towns indicates is that butchers were processing carcasses rapidly and in quantity (Seetah, 2004, 27; Seetah 2006, 113–14). Maltby (2007, 70) has argued that the supply of meat to towns may have been controlled by professional traders buying stock for processing by urban-based specialist butchers.

Professional butchers required a range of cleavers and specialised knives for their work and cleavers are a feature of Roman assemblages (Seetah 2004, 26; Manning 1985, 120–3, fig. 30; Monteix 2007, figs 14–19) (Fig. 14.3, 17–18). Iconographical evidence from Italy

provides images of both butchers and their knives and other equipment (e.g. Monteix 2007, figs 7–8). Whilst care must be taken using this iconographical evidence for other than comparative purposes it is clear that there were specialist butchers operating in towns in Roman Britain.

Structural metalwork

An obvious difference between Iron Age settlements and post-conquest settlements with rectangular buildings and other Roman features such as heating and a water supply, is the large-scale use of iron for structural fittings including nails, which are rarely found on Iron Age sites in Britain. A possible exception is Bredon Hill, Gloucestershire: Hencken (1938, 71) wrote that ‘The finds at Bredon, particularly during the early period, included a great many iron objects, not all illustrated. These included iron wedges, nails, rods and flat bars of iron ...’. The lack of structural ironwork and in particular the lack of nails from Iron Age contexts in Britain contrasts with sites like the oppidum of Manching in Bavaria where large quantities of nails were used in the construction of the *murus Gallicus* defences in the 2nd century BC.

The new architectural forms introduced by the Romans required hinges, latches and locks, window grilles (see the example from Margate: Manning 1985, 128, pl. 80, R18), iron collars for water pipes, and the ubiquitous nails found in numbers on most Roman sites. Perhaps most remarkable are the iron beams which it has been suggested were used to support tanks for heating water. They very clearly attest the increased scale of iron production and of iron use in the domestic sphere. Beams have been found at Chedworth (Glos), Catterick (N Yorks), Corbridge (Northumberland) and at the Jewry Wall site, Leicester (Wacher 1971). Numerous similar iron beams and fragments of beams have been found at the Saalburg in Germany (Baatz 1991).

Domestic ironwork

Within the house new forms of lighting equipment – lamps and candlesticks – were introduced by the Romans (Eckardt 2011, 182) and included iron lamps and hanging lamps, as well as the more common ceramic and copper alloy oil lamps. There are examples of iron hanging lamps from a grave found near the Preston Park, Brighton Roman villa (Kelly and Dudley 1981, 86, pl. 3) and from burials at Bayford (Kent) (Payne 1886, 8; Manning 1985, 99, pl. 44, P4–P5). An example was found at Lullingstone villa (Meates 1987,

102, fig. 46, no. 279) and recently another example has been found near Barcombe villa, Sussex (see Culver Valley Project website: http://culverproject.co.uk/?page_id=233). From Luton, near Chatham, comes a free-standing iron lamp (Manning 1985, 99, pl. 44, P3; Wickham 1874, 175, fig. 4).

The Romans introduced new foods and new ways of cooking and serving food. These are most clearly revealed by new forms of ceramic vessels for cooking and serving food (Cool 2006, 37–50). Although small oval frying pans with folding handles in both iron and copper are found in small numbers (see the examples from Ickham: Mould and Riddler 2010, 232, fig. 96, no. 723; also Wheeler 1930, 118–19, fig. 41, 1; Manning 1985, 104, pl. 50, P32–P33) the use of iron in the kitchen was largely limited to gridirons for cooking meat and fire tools, ladles, flesh hooks (e.g. Manning 1985, 105, pl. 51, P35–P38) and a wide range of knives of different forms and types (*ibid.*, 108–29 and figs 28–30). A good example of a gridiron comes from the Lullingstone villa and was found with the bowl of an iron ladle (Meates 1987, 107, fig. 49, nos 307–8) and there is a particularly large well-made gridiron from the 1890 Silchester hoard (Evans 1894, 153, fig. 21).

Craft of the blacksmith and organisation of the trade

The increased range and diversity of tools and implements and other ironwork and the increased quantities of ironwork in evidence from sites with Roman-style buildings provides a clear indication of the increased production of iron and of ironwork following the Roman invasion. The increasing range of ironwork and the introduction of implements such as butchers' knives and cleavers and of specialist wood-working tools such as planes and the variety of different saws all point to a developing market for ironwork and for increasingly specialised tools and knives, and provide evidence that more-specialised smiths worked in Roman Britain.

Iconography and inscriptions

Pride of place should perhaps go to the Purbeck marble inscription from Chichester dedicated by the *collegium fabrorum* (RIB 91; but see also Bogaers 1979). The words *collegium fabrorum* have sometimes been translated as 'guild of smiths' or 'guild of metalworkers' but this inscription does not provide unequivocal evidence for the organisation of smiths. In the context of the Chichester inscription Atkinson (1933) referred to a letter written by Pliny the Younger to Trajan in which he

argued for the setting up a *collegium fabrorum* to help with fire-fighting in Nicomedia (*Letters* 10, 33). The suggestion is that this would be a body of craftsmen or labourers, not firemen, available to help in the event of fire breaking out in the town. Waltzing (1895–1900, vol. 2, 193–4) suggests that the term *faber* was used for men working as masons, smiths, carpenters and other hard manual professions. *Collegia fabrorum* and their members were sometimes further defined by an adjective, for example (*faber*) *aerarius* (goldsmiths), *argentarius* (silversmiths), *ferrarius* (ironworkers, or blacksmiths), *eborarius* (workers in ivory), *navalis* (ship- or boat-builders), etc. Waltzing suggests that when *faber* or *fabrorum* was employed without a qualifying adjective it was used for the building trades, that is builders, carpenters and masons.

There are numerous iconographic representations of smiths and their tools from Italy (Gummerus 1913, 77–85, Abb. 7–10; Duval 1952, 51–4, figs 2–4) and Gaul (e.g. Duval *loc. cit.*; Reddé 1978, 44–6). Although there is only a single tombstone from Britain showing a smith with his anvil, hammer and tongs (from York: Yorkshire Museum no. YORYM 1998 20; Liversidge 1968, pl. 25b), there are other images of smiths, smith gods and smithing tools (e.g. Leach 1962, pl. 4, fig. 1; pl. 7, fig. 6). The so-called ‘smith urn’ from a well at St. Thomas Street, Southwark and depicting a smith’s hammer, pincers and possibly anvil is particularly relevant (Dennis 1978, 369, fig. 166, no.1273). There are other pots with smith’s tools from Canterbury (see <http://www.canterbury.co.uk/museums/roman-museum/Roman-everyday-life.aspx>) and from Colchester (Toynbee 1962, 191–2, cat. no. 162, pl. 191; Hull 1958, 144, no. 2, fig. 57, no. 2). The sceptre binding from the Farley Heath temple, Surrey also has images of tongs (Bird 2007, 47, figs 19–20).

Although there is no iconographic image from Roman Britain to compare with the well-known altar of the cutler L. Cornelius Atimetus which shows both the forging of knives and a display of finished knives (see Manning 1985, pls 16–17; also Clarke 2003, figs 66–7), the presence of knives and tools with makers’ stamps from archaeological contexts provides the best evidence of specialist cutlers (RIB 2, 2428). Most of the extant examples come from London. There are examples of a number of knives stamped *P. Basili (servus)* from sites in London including a razor from No. 1 Poultry (Hill and Rowsome 2011, 338, fig. 303, S35). Knives were also made by *Olundus*. Chisels stamped by *Aprilis* and *Martialis* have also been found.

Titulus made and stamped a leatherworker's iron awl, and *Bonosus* and *Reginus* stamped iron styli. All or some of these men could have been locally based. The most likely candidate for a local cutler is *Basilis* whose stamp appears on a number of knives. A late Roman knife stamped *Victor* on the blade was found at Ickham, Kent (Mould and Riddler 2010, 225).

Archaeological evidence for smithing

Structural evidence for smithing is difficult to locate with confidence because the hearths and anvils were often above ground and do not survive in the archaeological record. The key evidence for smithing is diagnostic slag and in particular hammerscale and smithing-hearth bottoms.

Rural sites

The information used in this section was provided by Dr Tom Brindle and is based on preliminary analysis of data collected by the Roman Rural Settlement Project based at the University of Reading. Evidence for metalworking and the presence of tools from excavations on rural sites in the counties of Kent, Surrey and Sussex produces some interesting results (Tables 14.1–2). Simple unenclosed farms are limited in number and produced no tools or agricultural tools and very little evidence for metalworking (Table 14.1). Farms with one or two enclosures ('enclosed farms') are more numerous and more than 40 per cent of these sites had tools and 20 per cent had agricultural tools. Farms with conjoined enclosures and multiple areas devoted to agricultural and domestic activities ('complex farms') were the most interesting sites because 80 per cent of these sites produced tools and 40 per cent produced agricultural implements (Table 14.1). Complex farms also produced more evidence for metalworking than other sites with 50 per cent having at least some evidence.

Only 33.9 per cent of villas produced evidence for tools and only 20.3 per cent evidence for agricultural implements. Similarly, only 15.25 per cent had evidence for metalworking. Evidence for tools and metalworking might have been expected from a larger proportion of villas, perhaps at a level similar to that from the complex farms. The difference may be due to a bias in the evidence from villas, some of which were excavated in the late 19th- and early 20th-centuries (pers. comm. T. W. Brindle).

Nucleated settlements, which include roadside settlements, industrial settlements and larger rural sites or 'villages', have the second highest percentage with tools, but fewer sites with agricultural

tools. Metalworking evidence was recovered from 24 per cent of the nucleated sites. In some cases, the archaeological interventions in nucleated settlements, particularly those now in modern urban areas, are comparatively small in scale.

Table 14.2: Numbers of tools and agricultural tools by site type

(a) Sites with tools			
<i>Site type</i>	<i>No. of sites</i>	<i>No. of sites with tools</i>	<i>% with tools</i>
Nucleated settlements	33	17	51.5%
Villas	59	20	33.9%
Complex farms	10	8	80%
Enclosed farms	45	19	42.2%
Unenclosed farms	6	0	0
(b) Sites with agricultural tools			
<i>Site type</i>	<i>No. of sites</i>	<i>No. of sites with agricultural tools</i>	<i>% with agricultural tools</i>
Nucleated settlements	33	5	15.15%
Villas	59	12	20.33%
Complex farms	10	4	40%
Enclosed farms	45	9	20%
Unenclosed farms	6	0	0
(c) Sites with evidence for metalworking			
<i>Site type</i>	<i>No. of sites</i>	<i>No. of sites with metalworking evidence</i>	<i>% with metalworking evidence</i>
Nucleated settlements	33	8	24.24%
Villas	59	9	15.25%
Complex farms	10	5	50%
Enclosed farms	45	13	28.9%
Unenclosed farms	6	1	16.66%

Table 14.1: Evidence for (a) tools, (b) agricultural tools and (c) metalworking

Site type	No. of sites	No of tools	Average number of tools per site	No. of agricultural tools	Average number of tools per site
Nucleated settlements	33	174	5.27	21	0.636
Villas	59	212	3.59	43	0.7298
Complex farms	10	48	4.8	13	1.3
Enclosed farms	45	36	0.8	15	0.33
Unenclosed farms	6	0	0	0	0

The finds from complex farms are particularly interesting and the composition of other aspects of their material culture suggest that they are more similar to villas than to enclosed farms. They have a wider range of finds and produced coins more often than enclosed farms. Complex farms and villas seem to be set up for greater agricultural production and their artefact assemblages suggest that they were more closely integrated into the market networks than enclosed farms and presumably the small number of unenclosed farms. Perhaps giving confirmation of this is the fact that individually, complex farms, villas and nucleated settlements have produced more tools and more agricultural implements than enclosed or unenclosed farms (Table 14.2).

The evidence for metalworking on villa sites is limited and much of the evidence appears in the late 3rd century and after. At the Mount villa, Maidstone the evidence for ironworking from recent excavations comprised less than 1kg of slag (Houlston 1999, 112). Recent excavation at Batten Hanger villa near West Dean, Sussex, produced scattered ironworking residues including hammerscale particularly from the later occupation of the villa in the late 3rd and 4th centuries (Sillar *et al.* 2006–2007, 56). Both the Chilgrove villas in West Sussex had forging hearths in the last phases of occupation (Down 1979, 43 and 50). At Chilgrove 1 in Period 5 (late 4th–5th century) a forge had been built into the floor of room 8, and there is reported to have been evidence for the forging of tools, fittings and nails (*ibid.*, 92). At Bignor Villa, West Sussex, in Phase IIIA (late 3rd to mid-4th century) hearths were inserted into Room 40 (Frere 1982, 141, 157, figs 12–13) and the associated residues included smithing slags (Salter 1982).

There is evidence for metalworking in two villas investigated in advance of construction of the Channel Tunnel Rail Link (now High Speed 1). The Northfleet villa, north of Springhead near the mouth of the Ebbsfleet, produced three complete smithing-hearth bottoms (Andrews *et al.* 2011, 226; see also Andrews in Biddulph *et al.* 2011, 309–11). Ironworking at Northfleet could have started as early as the 1st century and continued at least into the late 2nd century. A possible

smithing hearth had been identified by Steadman (1913) in earlier excavations in a part of the villa now known to have been built in the second half of the 2nd century (Andrews *et al.* 2011, 226). Millett has suggested that this site may have been a trading site with a wharf rather than just a villa (Millett 2007, 169). At Thurnham Villa, Kent, the slag recovered in excavation indicated smelting in the late Iron Age and early Roman period but smithing in the late Roman period (Keys 2006). In the latest period of occupation from the mid-3rd century to the early 5th century a room in the main villa building was converted into a smithy (Lawrence 2006, 102–5, figs 49 and 51). The ironworking seems to have been on a small scale. A concentration of small mammal bones possibly from an owl pellet suggests that the room was derelict and being used as a convenient shelter for both smith and owls.

The evidence from villa sites suggests that any ironworking was on a very small scale and some of the residues may represent fabrication of structural ironwork during construction work. At most the evidence for ironworking and smithing before the 3rd century indicates no more than work to meet local requirements for repairs and for the fabrication of basic tools and ironwork, not aimed at production for the market. More complex or specialised ironwork must have been obtained from specialist smiths through the market network. Excavations at Fishbourne Palace, Sussex have produced only limited ironworking evidence in the form of small quantities of slag on site (Tylecote 1971; Barber 2006). The requirements for structural ironwork for such a large site would have been considerable.

Only in the late Roman period does there seem to be a regular occurrence of ironworking on some villa sites, often within the villa building, as for example at Bignor, Thurnham and both Chilgrove villas. Nonetheless there is little evidence for late Roman ironwork production on a scale comparable to that uncovered at the Chesters Villa, Woolaston on the Severn Estuary in Gloucestershire (Fulford and Allen 1992).

Roadside settlements and urban sites

The probable roadside settlement at Staines, Surrey has produced some evidence for iron smithing in excavations on the High Street. At least three sites in Staines have revealed some evidence for Roman ironworking (Jones 2010, 26; Crouch and Shanks 1984, 13 and 114; Bird 2004, 58). Recent excavations in the roadside settlement at Arlington, East Sussex have produced evidence of iron smelting

(Chuter *et al.* 2008). The site lies on the Roman road that runs west-north-west from Pevensey at the point where it crosses the Cuckmere.

The settlements at Westhawk Farm and Springhead in Kent and at Southwark have produced more substantial evidence for smithing. Two probable smithies were located at Westhawk Farm, Ashford. One smithy (structure R) was identified by concentrations of hammerscale and was associated also with smelting slag and bloomery furnaces (Paynter 2008, 276–8, figs 7.8–7.9). The second smithy (Structure I) had less well-preserved structural evidence but had associated smelting slag, smithing-hearth bottoms and accumulations of hammerscale (*ibid.* 272–6, figs 7.6–7). Structure I seems to have dated to the late 1st to 2nd century whereas Structure R seems to have dated to the 3rd century. The ironworking at Westhawk involved smelting, primary smithing to produce billets of iron from blooms, and some limited secondary smithing (*ibid.*, 292–3). A single billet of iron was recovered in excavation (*ibid.*, 287–8; Scott 2008, 186, fig. 5.10, no. 2) (Fig. 14.1, 1). The excavator concluded that although iron production was important to the site's economy, the Westhawk Farm settlement was not primarily an iron production site (Booth *et al.* 2008, 383). A similar workshop with smelting furnaces was identified at the nearby Runhams Farm Romano-British settlement at Lenham (Paynter 2007, 23; Philp 1994).

At Springhead two possible smithies were uncovered during works in advance of the construction of the Channel Tunnel Rail Link (High Speed One). Structure 400049 seems to have been built towards the end of the 1st century and continued in use into the early 2nd century (Andrews *et al.* 2011, 42–3, fig. 2.24). There was little in the way of structures but smithing slag was found. Structure 10 appears to have been in use at much the same time as Structure 400049 (*ibid.*, 121–2 and figs 2.89–90) and produced more smithing slag than Structure 400049 (Andrews in Biddulph *et al.* 2011, 309–11). Earlier excavations at Springhead had produced evidence of a blacksmith operating in a derelict building in the 3rd century and later (Penn 1968, 166, 169). The evidence included hammerscale and ironwork (*ibid.*, 169, 187–8, 191).

From the *civitas* capital of Canterbury there is evidence for a possible industrial area in the north-west part of town. On a site on the north side of St Margaret's Street a sequence of early 2nd-century timber-framed shops opposite the public baths seem to have been commercial premises with evidence for bowl hearths and keyhole-

shaped ovens probably for copper alloy metalworking (Blockley 1995; Wacher 1995, 202). To the south of St Margaret's Street further evidence for craft workshops was uncovered dating from the mid- to late 2nd century (Blockley *et al.* 1995, 101–14, figs 48–50, 52–7). In the late 4th century hearths were inserted into the bath house excavated on St Margaret's Street. An adjacent pit contained slag and it is most likely that the hearths were for ironworking (Blockley *et al.* 1995, 190–1; Rogers 2008, 495–6). The building continued in use to the end of the 4th century and probably later.

At Chichester excavations outside the South Gate produced smithing slag suggesting the possibility of a smithy in the vicinity (Down 1981, 70–2, figs 6.8–9). There is also slag 'from forges' found outside the East and West Gates (Down 1988, 38–40; Down and Rule 1971, 143). Ironworking at Chichester may have begun in the 1st century on the St Peter the Less site located to the east side of North Street which ran to the North Gate (Murray 1962, 93–9; Down and Rule 1971, 9). Evidence for ironworking in the 4th century in the form of hearths and smithing slag was found in excavations in the Cattle Market to the south-east of the town (Down 1988, 78; Down 1989, 57, 74, 82, 143–7).

At Silchester, Hampshire, recent excavations in Insula IX have produced evidence for iron production on a small scale. The recovered ironworking residues are mainly from smelting (Fulford and Clarke 2011, 234–40). In the late Roman period there is clear evidence for industrial activity in the north range of the Forum Basilica beginning in the second half of the 3rd century (Fulford and Timby 2000, 72–5). The slags recovered included smithing slags (Richards 2000).

At Verulamium excavations in insula XIV produced evidence of workshops and of craftsmen working in metals including iron (Frere 1972, 11–12). The shops and workshops in Insula XIV originated in the mid-1st century AD (*ibid.*, 13–23, fig. 8) and were rebuilt after the Boudican revolt (*ibid.*, 23–41, fig. 10). The buildings were rebuilt several times before being destroyed by fire in c. AD 155–60 (*ibid.*, 98). The area was left empty for some time and the buildings were rebuilt only in the late 3rd century. The evidence for metalworking and other crafts is strongest for the earliest two phases. The late 3rd-century reconstruction may have included a blacksmith's shop but the main evidence is the presence of a mixture of iron objects in the cellar of one of the destroyed buildings (*ibid.*, 105, fig. 22).

At Southwark evidence for more extensive metalworking both in

iron and non-ferrous metals has been found and explored through a number of excavations. Excavations in the Borough High Street area uncovered a possible pre-Boudican smithy (Building 3: Drummond-Murray and Thompson 2002, 28–9, fig. 31) and another smithy (Structure 2) which was established in the late 1st century developed and continued to be used into the late 2nd or 3rd century (*ibid.*, 61–2, 82–3, 96–7, fig. 76). Much of the later stratigraphy on the site had been truncated (*ibid.*, 122). Quantities of ironworking residues including smithing-hearth bottoms and deposits of hammerscale were recovered from both smithies (Keys 2002, 240–2, tables 113–114). The well with the ‘smith urn’ found in the excavations in St Thomas Street (Dennis 1978, 369, fig. 166, no. 1273) was about 20m east of the smithy. As already noted the well and two adjacent pits contained the remains of 20 dogs (Drummond-Murray and Thompson 2002, 97). Dogs were associated with Sucellus the ‘mallet god’, who was perhaps also figured on the Farley Heath sceptre mount (Bird 2007, 47, figs 19–20).

More extensive evidence for metalworking including iron smithing was revealed in excavations on the Courage Brewery site in the north-west of Southwark adjacent to the Thames foreshore (Hammer 2003, fig. 16). Both ironworking and non-ferrous metalworking were identified. Ironworking workshops were found dating from the late 1st century to the early 4th century (*ibid.*, 33–105, 151–71). After a break metalworking was briefly re-established in the late 4th century (*ibid.*, 117–18). Various ironworking slags including smithing-hearth bottoms and hammerscale were recovered (*ibid.*, 131–40). Other sites with evidence for ironworking have been found in London as for example at 60–63 Fenchurch Street where there was evidence for Flavian and early 2nd-century ironworking (Birkbeck and Schuster 2009, 23–5, figs 21 and 22).

Discussion

It has been argued that the needs of the Roman army for food, fodder and other supplies would have been enormous, that iron would have been one of these requirements and that this would explain the expansion of iron production in the Weald in the immediate aftermath of the Claudian invasion (see Hodgkinson, this volume). The army’s own smiths could have provided some of the workforce required to work the iron produced by the bloomeries, but more smiths including native smiths were probably needed to meet the army’s demands.

When the Army moved on the expansion of iron production with more bloomery sites operating was sustained partly by continuing demand from the army but also by growing demand from the civil population. Verboven (2007) has argued that military markets were the key to the introduction and development of the wider range of consumables, including ironwork products, which were introduced following the Roman invasion. The native elite could embrace new ideas, new foods and dining, and new forms of housing as they endeavoured to establish themselves within the new political arena created by the Romans.

Woolf (1998, 181–5) argues that the Roman conquest of Gaul led to a ‘consumer revolution’ that made available an increased and more varied range of goods but that also introduced new values and tastes. In Britain there is clear evidence for a similar expansion of goods available as the island was brought into closer contact with the markets and trade routes of the Empire. Consumption is a means to establish social identity and in the new social and political world created by the Roman conquest it was perhaps all the more important. At the same time this new world was fraught with potential dangers for the old elite as it tried to maintain its position. Down the social scale particularly on small farms and in smaller rural settlements the options were more limited and the resources to enjoy the new Roman ways were not always available. At the lowest level farms were working at or near subsistence level and were generating little or no surplus to sell at market. For this reason, smaller farms and rural settlements would not have the range of ‘Roman’ material culture associated with villas and urban centres, even if they desired them. Further up the settlement ladder larger farms and settlements probably produced surplus for the market and were able to buy into new opportunities for consumption that the Roman conquest brought in its wake.

In the new expanded market with its increasingly diverse products at least some craftsmen were able to make a good living at their craft. The ability to work at their craft full time would undoubtedly help with the development of craft skills. Smithing developed and diversified and some smiths clearly developed specialist skills. The presence of ironwork with makers’ stamps implies smiths who specialised in the manufacture of knives, razors, various tools and styli. These specialist suppliers of ironwork may have been men from outside the province who spotted the opportunities offered by the

opening of new markets, but it is just as likely that they included British smiths who adapted to the requirements of the new expanding market for iron products. Verboven (2007) has suggested that in the north-west provinces of the Empire time-expired legionary craftsmen, including smiths, may have set themselves up in business on discharge from the Army.

There is evidence for ironworking and smithing on a small scale on rural sites, from roadside settlements and from larger urban sites. The evidence ranges from small quantities of ironworking slag and residues to smithing sites and workshops. On rural sites the evidence suggests that more ironwork is present on larger farms and settlements and that metalworking evidence is more likely to be found. The larger farms and settlements are more likely to have a wider range of cultural material and simply more finds implying greater access to markets. The evidence from urban sites is patchy. The best evidence has been found at Southwark where metal and craft workshops over a quite extensive area have been investigated. The evidence from larger towns such as Canterbury and Chichester is less certain but evidence for ironworking has been uncovered. There is evidence for metalworking and for iron smithing, but nothing comparable to the evidence from Southwark. Nonetheless it is likely that smiths providing more specialist items were based in urban areas where there was a market. The evidence perhaps suggests that there was a market for iron tools and implements with urban-based specialist smiths working full-time for the market at one end of the scale and locally-based rural smiths, probably also working as farmers, providing basic tools and repairing broken ironwork at the other end.

The scale of metalworking – both iron and non-ferrous metals – at Southwark seems to be greater than is in evidence elsewhere in urban areas in the south, with the possible exception of Verulamium. At Southwark the scale of the industry is perhaps comparable to that found in the excavated ‘artisan quarter’ of Autun (Augustodunum) (Saône et Loire) France (Chardon-Picault and Pernot 1999). At Autun a zone with workshops for ironworking, non-ferrous metalworking, bone- and horn-working and potting was uncovered. The ironworking evidence included smithies or workshops, slag and other residues (*ibid.*, 201–18) and possible products of the smiths (*ibid.*, fig. 177). None of the evidence from towns for metalworking in general and ironworking in particular appears to suggest production on a large scale although modern views of scales of production based on factory

output perhaps distort perceptions. In pre-industrial societies production of ironwork or any craft product was increased by employing more smiths or craftsmen.

There is clear evidence that in the 3rd century something happened that disrupted the iron industry. Many Wealden bloomery sites closed down from the mid-3rd century leaving smaller numbers operating, and other ironworking areas seem to show a similar pattern with the exception of the Forest of Dean. At the same time there is evidence in the late Roman period for smithing hearths and evidence for ironworking inside a number of villas for example at Bignor and Chilgrove I and II (Down 1979, 43 and 50), at Thurnham and at Northfleet (Andrews *et al.* 2011, 226). Thurnham is the most extreme example since the room converted to a workshop or smithy appears to have been semi-derelict (Lawrence 2006, 102–5, figs 49 and 51). On the other hand, at Bignor the final flourishing of the villa follows the phase in which an ironworking hearth was inserted into the villa (Frere 1982, 141, 157, figs 12–13). In Canterbury hearths interpreted as smithing hearths were inserted into part of the St Margaret Street bath-house. This seems to be part of a pattern not limited to the south-east of the country. Rogers (2005; 2008, 495–6) has collected the evidence for metalworking in public buildings in major towns and there is a clear pattern. Rogers has questioned whether this represents ‘decline’. He suggests (Rogers 2005, 30) that the reduction in bloomery activity in the later 3rd century put more emphasis on the re-cycling of materials and that the need to secure supplies of iron and other metals led to centralising of production in public buildings (*ibid.*, 31). Whatever the merits of this thesis it is clear that there was a major change in iron supply in the late Roman period in Britain. This may have been caused by or been in response to the uncertain political and economic conditions in the 3rd century.

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Chapter 15

Roman Non-Ferrous Metalworking in Southern Britain

Justine Bayley

Abstract

During the Roman period copper and its alloys, gold, silver, lead, tin and pewter, were all used to make a wide range of decorative and utilitarian objects. While some of these objects were made in other parts of the Roman Empire there is a growing body of evidence for production in Britain. This paper will first outline the processes used to turn both newly smelted and recycled metals into objects, and will describe the archaeological finds which provide evidence for these processes. Assemblages of metalworking finds from sites across southern Britain will then be used as case studies to show how archaeological finds can be interpreted to give a broader picture of the place of metalworking in Romano-British society.

Introduction

Metalworking is an umbrella term that covers all the processes used to obtain metals from their ores and then convert them into objects. It is not a single homogeneous activity but a series of individual processes which are carried out sequentially, either on a single site or at a number of different locations. [Fig. 15.1](#) shows the different processes for which archaeological evidence has been found, and demonstrates how the product of one process is the raw material for the next; when eventually discarded or broken, objects were recycled, completing the cycle.

The primary production of metals – extracting them from their ores – is not considered here. The reason for this omission is that the geology of southern and eastern Britain is mainly sedimentary, while non-ferrous metal ores are normally found in igneous or metamorphic rocks (Bayley *et al.* 2008, fig. 2). The area south and east of the Jurassic ridge has only iron ores (*cf.* Hodgkinson, this volume) although there are lead-silver ores in the Mendips, and a variety of ores, most notably of tin, are found in the south-west peninsula. This

paper will therefore be discussing the secondary working of all metals other than iron and its alloys, and where the term ‘metalworking’ is used below, this is the meaning to be associated with it.

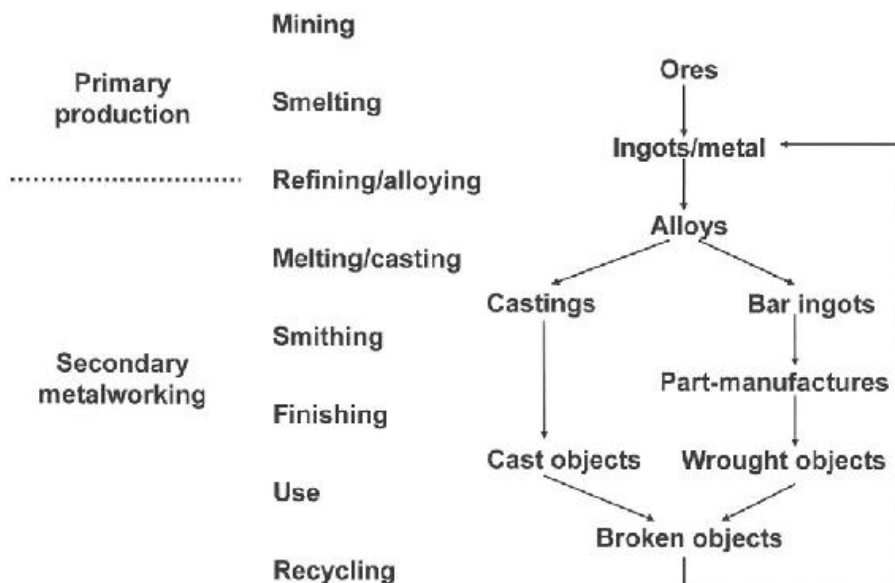


Fig. 15.1: The metalworking cycle.

Continuing my definitions, I shall here be dealing mainly with the first four centuries of our era. There is continuity of many metalworking practices from the pre-Roman Iron Age into Roman Britain so it is not possible to select a single date, such as the Claudian conquest in AD 43, as a meaningful boundary, as the changes that can be identified (see [Case Study 1](#), below) happen at different times in different areas. Finally, by southern Britain I here mean mainly what we now call the South-East. Some of my examples come from further afield though similar finds are also known in the core area.

The data set on which this survey is based had its origin in my PhD (Bayley 1992); its gazetteer includes around 100 sites of Roman date within southern Britain. More recent excavations are also noted where they produced significant additional material, but the sites mentioned below are examples rather than an exhaustive list.

What is the evidence for secondary metalworking?

[Fig. 15.1](#) clearly shows that the starting point for any secondary metalworking is the metal itself, whether newly smelted or recycled. The output from smelting was large ingots that were widely traded, and some have been found in southern Britain.

Lead pigs (ingots) are most common near lead-mining areas but

examples are recorded from Cirencester, Stockbridge, Clausentum (Southampton), Pulborough, Richborough and Cheshunt (Tylecote 1986, 72–3), and in 1995 three were found in London (Brigham and Watson 1988, 47). Tin ingots are not nearly as common, even in the south-west peninsula (Quinnell 2004, 74), but a fragment was identified from Rockbourne (Beagrie 1989a) and an intriguing recent hoard from Flexford (Surrey) appears to include fragments of a tin ingot (David Calow, pers. comm.).

Ingots of alloyed metals are also known, with pewter being the most common; these too were likely to have been traded over long distances. A discovery of two complete plano-convex pewter ingots on the Thames foreshore in Battersea in 1996 has led to their publication together with old finds of another ten from the same area (Hall 2014a) and fragments of further pewter ingots are known from Baldock (Bayley 1986a, 386) and Silchester (Gowland 1901, 417). There are two rectangular brass ingots from Gloucester (Bayley 1998a, 11) and a large plate of wrought brass weighing over 9kg from the Sheepen excavations in Colchester (Musty 1975), while the same excavations also produced the corner of a rectangular bronze ingot (Niblett 1985, 29 and M3:D14).

Further evidence for metalworking is provided by scrap and waste metal such as offcuts from wrought metalworking or the boxes of filings from Verulamium (Frere 1972, 11 and 18; see [Case Study 4](#), below), though spillages of molten metal are more common. A few failed or unfinished castings and parts of castings such as sprues and runners have been identified, though they are not common; for unfinished brooches see the list in Bayley and Butcher (2004, 36–7). There are examples in metals other than copper alloys such as a partly-finished pewter plate from Hockwold which has the base perforated by the chuck as it was being finished on a lathe (Gurney 1986, 148). Unfinished wrought objects, like the one-piece Colchester brooches from Baldock (Stead and Rigby 1986, 123) are also known, though they can be difficult to identify.

As most metal would have been recycled, the commonest finds overall are crucibles ([Fig. 15.2](#)). This is partly because they are durable, and they are also readily recognisable, even in small fragments, as their vitrified surfaces are often brightly coloured. Crucibles would also have been used in considerable numbers as there is little evidence that they were used more than once because the cost of losing metal into the fire if they failed would have been high

compared with the cost of a new crucible. Crucibles were used to melt metal in order to make castings but are also found where wrought metalworking was being carried out, as metal was melted and cast into small bar- or disc-shaped ingots, perhaps in depressions in the earth of the workshop floor, which were then hammered out into bars, rods, wire or sheet metal.

Crucibles can be defined as portable reaction vessels (Bayley and Rehren 2007) and these reactions can be physical changes such as metal melting, as described above, but other types of crucibles were used as containers in which chemical changes took place. Examples are the crucibles in which brass was made by the cementation process: see [Case Study 2](#), below. There are other fired-clay vessels that can be described as ‘crucibles’ but they were used for other processes, particularly where precious metals were being assayed or refined. They should more properly be described as cupels or parting vessels: see [Case Study 3](#), below.



Fig. 15.2: Crucibles. Top left, Iron Age, from Thetford, Fison Way (height c. 50mm); top right, early Roman, Colchester Castle (height c. 26mm); bottom (all Roman), left, thumb pot with traces of an attached lid and side hole from Corbridge (height c. 60mm); centre, beaker with added outer layer of less-refractory clay from Dorchester, Merchant's Garage (height c. 120mm); right, conical-based, from Snodland, Kent (height c. 100mm). (Photographs ©Historic England).

Clay moulds should also be common finds as they were not used

more than once. However, they were normally made of fabrics that contain little mineral temper and are not fired to high temperatures so are relatively soft. They are thus not durable, so often only survive in recognisable form when they were buried soon after they had been used, and so avoided the abrasion or crushing which must have been their usual fate. Two sorts of Roman clay moulds are known: investment moulds and piece moulds. The former were made by encasing a wax model of the desired object in soft clay, drying and then firing it to melt out the wax. Piece moulds were made by pressing a permanent model made of wood or metal onto one lump of clay and then pressing another piece of clay onto the model's other side; the two valves of the mould were then taken apart, the model removed and the mould reassembled, dried and fired. The advantage of a piece mould was not that the mould could be re-used but that the model was re-used many times over allowing mass production of a sort; most small Roman castings were made in piece moulds.

There are few large, published assemblages of Roman clay piece moulds such as the spoon and vessel moulds from Castleford (Bayley and Budd 1998). Some moulds were assembled from multiple mould pairs so a large number of the same object could be cast at once. Examples are the spoon moulds from Castleford and coin moulds, such as the hundreds from 85 London Wall, London which provide evidence of the practice of counterfeiting which was common in the later Roman period (Hall 2014b). There are even fewer investment moulds which at this period were used to cast one-off pieces such as statuary. The fragments from Gestingthorpe show the form of the hollow statuette being cast (Frere 1970; Draper 1985, 78) and the arrangement of runners that fed the molten metal from the attached sprue cup into the mould.

More usually all that survive are a few fragments from which it is normally not possible to identify what sort of object was being produced. However, these fired-clay fragments can be positively identified as moulds as they are oxidised-fired (red) on their outer surfaces and reduced-fired (black or grey) in the zones near to where the metal solidified. All objects were cast in something close to their final form; little cold working of the castings other than removing the sprue would have been needed to turn them into useable artefacts, though cast brooches needed the edge of the catchplate turning over to hold the pin.

Stone moulds were used in Roman Britain, but normally only for

casting pewter vessels. These two-piece moulds were double-sided and stacked, allowing more than one plate or dish to be cast at once. There are large numbers from Lansdown near Bath (Bush 1908; Lee 2009, 152–73) and nearby at Nettleton (Wedlake 1982, 68–74). Fragments of similar limestone moulds have been found in the surrounding area but also much further away; for example, seven fragments came from Silchester (Blagg and Read 1977).

Copper alloy moulds for casting copper alloy objects are well known in the Bronze Age, but recently several examples for casting Romano–British brooches have been found in East Anglia (e.g. Bayley *et al.* 2001a). These are not as impractical as they seem at first sight. The lack of large numbers of examples is almost certainly due to their being re-cycled once fashions for a particular type of object changed.

Slags are ubiquitous finds where ironworking has been carried out (Bayley *et al.* 2001b, 10–11) but are not produced by secondary non-ferrous metalworking, though occasional flecks of corroding copper alloy may become embedded in iron slags if both metals are being worked in the same workshop. Fragments of vitrified clay hearth-lining with traces of non-ferrous metals can indicate what was being melted or annealed in the hearth.

The final indicators of metalworking are the tools used by the craftsmen. Most of these were made of iron (*cf.* Scott, this volume) – objects like hammers, tongs, files, chisels and punches – and the toolmarks they left on the objects being made often survive, particularly on the back or inside them. Whetstones were also used to shape or polish metalwork.

What metals were worked?

The non-ferrous metals that were used to make objects included gold, silver, copper and its alloys, lead and pewter and each of these is considered in turn.

Gold

Gold was used for coinage and for high quality jewellery that was normally wrought, as thin pieces can be produced, making the metal go much further than it would as castings. It was also applied to silver and copper alloy objects, the gilding giving the illusion of quality and wealth. Gilding is never a common decorative technique, but it is found more often from the 3rd century onwards when mercury (fire) gilding came into general use (Lins and Oddy 1975, 371). A mortar for preparing gold-mercury amalgam has been found near the Roman fort

at Clausentum (Southampton), but it may be post-Roman in date (Bayley and Russel 2008).

Silver

Silver was used to make wrought vessels, especially in the later Roman period, like those found at Water Newton and Mildenhall (Hobbs and Jackson 2010, 136–7 and 150–1), and also occasionally for casting small decorative objects such as finger rings and brooches. In the 1st century AD thin silver sheet was used to decorate brass objects such as military fittings (e.g. Niblett 1985, fig. 61, 8). Contemporary cheaper versions of this white on yellow effect was achieved by tinning parts of objects such as Hod Hill brooches. Early Roman silver is relatively pure, with small amounts of copper added to harden the metal. This is quite different from the precious metals used in the late Iron Age where ternary alloys with significant amounts of gold, silver and copper were normal (Northover 1992, 239). In order to incorporate this Iron Age metal into the Roman metal pool it had to be refined, and there is good evidence for this in the 1st century (see [Case Study 3](#)). Later in the Roman period the purity of silver was more variable with debasement common, especially for the coinage.

Copper and its alloys

Pure copper was not widely used in Roman Britain, except as thin sheet metal cladding, a use for which it was well-suited because of its malleability. A wide range of copper alloys were commonly used for different decorative and utilitarian items, with personal, domestic, commercial, ritual and military functions. Examples are brooches, spoons, coins, statuettes, and *phalerae* and other fittings for armour.

The copper alloys contain additions of tin, zinc and/or lead and have a range of properties. The pinkish colour of copper is modified by the additions to become pale brown, white or yellow. Those alloys with up to a few percent of lead are good for wrought working, while those with high lead contents can only be cast. What to call these alloys has often been a problem, but the old archaeological convention of describing them all as ‘bronze’ will no longer do as it has been demonstrated that bronze, in the modern metallurgical sense (*i.e.* an alloy of copper and tin), was used to make only around 20 per cent of Roman brooches found in Britain (Bayley and Butcher 2004, 14). If the definition is stretched to include leaded bronzes (alloys of copper with tin and lead) then the proportion rises to about 45 per cent whether just brooches are considered (*ibid.*) or a wider range of metal

objects (Dungworth 1997). Fig. 15.3 shows the names now widely used to describe copper alloys. Note there are no hard and fast divisions between the alloys, as copper can be mixed with the alloying elements in any proportions. The closer you get to a corner, the higher the proportion of that element; for example, brass is mainly copper and zinc, while a leaded bronze contains significant amounts of both tin and lead (but virtually no zinc) added to copper.

Lead

Lead was widely used, for plumbing in buildings (roof flashings, pipes and for seating iron fittings in stonework), for containers such as tanks and coffins, as well as for small portable objects such as weights. The problem with lead-working is that it leaves very few identifiable finds. Lead can be melted in any ordinary cooking pot and may leave no trace in it. Because it is so soft no specialised tools are needed to work it so there is little specific evidence for lead-working. However, there would have been a need for plumbing in all towns and villas so lead use, and hence lead-working, must have been widespread.

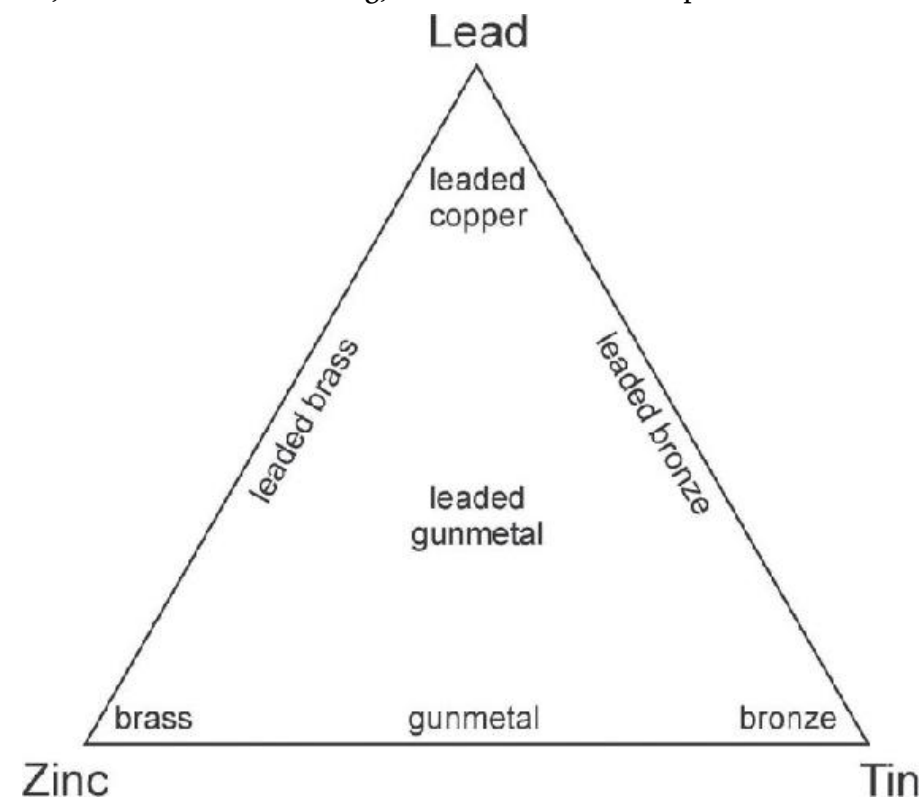


Fig. 15.3: Names used for copper alloys.

Pewter

In the Roman period pewter was an alloy of just tin and lead in variable proportions (Beagrie 1989b). It was used for making cast vessels which become relatively common from the 3rd century onwards, though there is more limited casting of pewter or unalloyed tin somewhat earlier (e.g. Jones 1983). Pewter working was common in the area around Bath, probably as it is close to the lead deposits of the Mendips and relatively near the tin deposits of Cornwall. Pewter objects are fairly common finds in southern Britain (e.g. Brown 1973) and ingots or other large masses of metal are also widespread, with finds from the area around the Mendips as well as further away (e.g. Hall 2014a).

Case studies

Case Study 1. Late Iron Age and Roman metalworking compared

In many ways the few centuries before and after the Roman conquest of Britain are notable for the continuity of traditions in metal use and metalworking though the quantity of metal in circulation increased dramatically. There are, however, some significant differences in the use of metals and in the ways they are worked. Brass goes from being an exotic alloy to a common one (Bayley *et al.* 2008, 48); lead, and later pewter, become more widely used, and the introduction of precious metal refining (see [Case Study 3](#), below) means the mixed precious metals of the Iron Age give way to relatively pure gold and silver. Many metalworking traditions continue, especially for wrought metalworking where there is little major change until the mechanisation and industrialisation of recent centuries, but the design of crucibles and the way they are heated changes, as does clay-mould technology.

There are significant differences between Iron Age and Roman crucibles. The former are always hand-made, and as the fabrics are usually not very refractory they have to be heated from above while many Roman crucibles are thinner-walled, wheel-thrown forms made from more refractory fabrics, though the vessel proper is often protected from the direct effects of contact with the fire by an added outer layer of less refractory clay; this can be extended above the rim to make either a lid or a pouring lip ([Fig. 15.2](#)). Because of their more refractory fabrics, Roman crucibles were normally heated from below which produces a rather different pattern of vitrification (Bayley and Rehren 2007, 53).

During the Iron Age clay moulds are invariably investment (lost

wax) moulds. The large assemblage from Gussage All Saints includes moulds for casting horse fittings such as bridle bits and terrets, and was found with crucibles and also modelling tools for making the wax originals round which the moulds were formed (Spratling 1979). Roman clay moulds for small objects are normally piece moulds, and the only investment moulds are for large one-off castings, as noted above.

Coin pellet moulds are a specifically Iron Age class of metalworking finds which appear in the early 1st century BC when coins began to be made in southern Britain (Harding 1974, 209). These moulds are usually rectangular clay slabs with a regular array of circular, flat-bottomed depressions of larger or smaller diameter in them. Precious metal fragments or filings were weighed out into these hollows and were heated from above. The molten metal solidified in the hollows, producing convex-topped metal prills as the precious metal did not 'wet' the clay; these were then struck to make coins. The coin pellet mould's function was as mini crucibles, so it is not surprising that traces of metal-rich vitrification were often produced. Collis (1985) argues that the frequency with which they are found outside major settlements demonstrates only that coin production was not always centralised, not that there must have been an alternative use for the moulds. This minting technology went out of use after the Roman Conquest so coin pellet moulds that are found in later contexts must be residual.

Case Study 2. Small-scale Roman brass-making in Britain

Before the Claudian conquest brass was an exotic metal, used mainly for 'ritual' objects (*e.g.* Bird 1994, 98–105) and brooches (*e.g.* Bayley 1989), though one of the earliest brass objects from Britain is a sword with sheet metal appliqué (Bayley *et al.* 2008, 43). Brass is an alloy of copper and zinc that only became common in Europe in the 1st century BC. It could not be made by melting copper and adding metallic zinc as the latter was virtually unknown in Europe until post-medieval times (Craddock 1995, 317–18). Instead, finely-divided copper was mixed with calamine (a zinc carbonate ore) and charcoal (to provide a reducing atmosphere) and placed in a lidded crucible. This was then heated to just below the melting point of the copper so the zinc vapour that was produced diffused into the metal, turning it into brass (Bayley 1998a).

Small crucibles used for this process have been identified at Colchester (Bayley 1984; Bayley and Budd 1992, 196) and Canterbury

(Bayley 1984; 1987) and a lid from a brass-making crucible has more recently been found in London (Bayley 2006) (Fig. 15.4). It appears to come from a small, hand-made vessel similar to the many small brass-making crucibles found at Xanten on the lower Rhine (Rehren 1999). Their fabrics are all rather friable so they may have been more common than these limited findspots suggest. Although brass was in widespread use in Roman Britain, there is little other confirmed evidence for its production so it is possible that the bulk of the metal was imported in the form of ingots which are known and have been discussed above.

Case Study 3. Precious metal refining

Silver refining was carried out in the late Iron Age at Hengistbury Head (Gowland 1915; Cunliffe 1987, 75); the evidence for this is fragments of litharge cakes which are also known from a number of Roman sites including London, Silchester, Winchester and Dorchester (Bayley and Eckstein 1997, 109). The refining process is known as cupellation and was carried out in the following way: the silver was melted together with a larger amount of lead on an absorbent hearth, usually lined with bone ash (burnt crushed bone). The molten metal had air blown across its surface, oxidising the lead to litharge (lead oxide) which then oxidised and dissolved any base metal such as copper that had been present in the silver. The litharge was absorbed by the hearth lining, producing what are known as litharge cakes, and the purified silver was left sitting on the surface of the hearth. Litharge cakes are typically 100–200mm across, up to 40mm thick and very dense. The litharge cakes formed as a by-product of silver refining differ from litharge that is sometimes found on lead-smelting sites as the former always have a significant copper content.

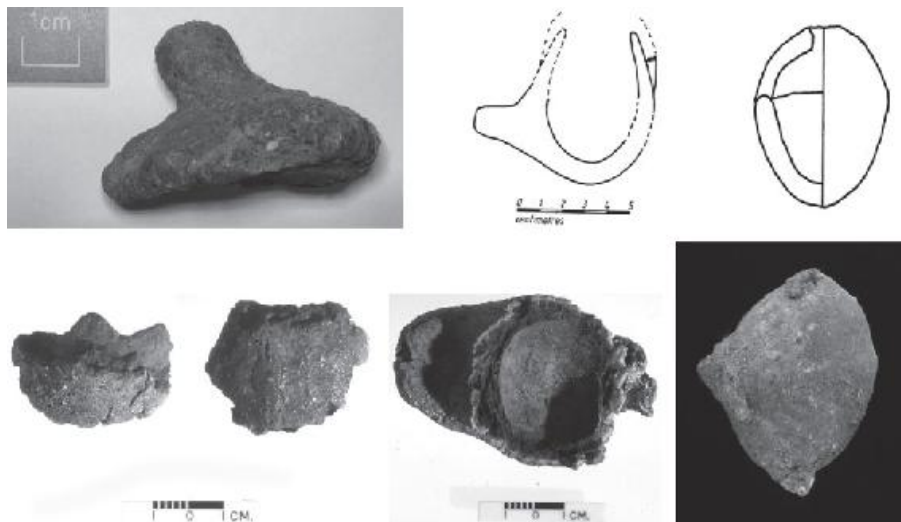


Fig. 15.4: Brass-making crucibles from Colchester (centre top and below centre and left, diam. 55mm), Canterbury (below, far right, diam. 58mm) and a crucible lid from London (top left, diam. 50mm). (Photographs ©Historic England).

Cupellation was also carried out on a far smaller scale when it was necessary to test the purity of a batch of silver or refine just a small amount of the metal. The same process was used but instead of a hearth, a shallow ceramic vessel was used. The lead reacted with it to produce a lead-rich glassy slag which retains the imprint of the silver prill that solidified in its centre (e.g. Bayley 1991b, fig. 4, 3).

As mentioned above, the precious metal in circulation in southern Britain at the time of the Claudian conquest, mainly in the form of coinage and jewellery such as torcs, was a range of ternary alloys with significant amounts of gold, silver and copper all present. The typical ternary Iron Age alloys were 'romanised' in order to produce the relatively pure silver and gold that was in use in the early Roman Empire. The key process used is known as parting – which separates gold from silver. Though only recently recognised on any scale (Bayley 1991a), parting appears to be a Roman introduction to Britain as there was no need for it in the Iron Age.

The active ingredient in parting was common salt. Medieval treatises describe the process (Bayley 2008) which can be summarised as follows: thin sheets of metal surrounded by a silica-rich 'cement' that contained common salt were packed into sealed ceramic vessels. The vessels were heated just below the melting point of the metal and chloride ions from the salt attacked the metal, forming volatile silver chloride (and copper chloride, if any copper was present in the metal).

The metal chlorides were absorbed by the ‘cement’ and the vessel walls. The chloride ions also reacted with iron compounds in the ceramic of the vessel, forming ferric chloride which is also volatile. Iron was thus removed from the surface of the ceramic, giving it its bleached appearance, and then re-deposited as haematite, producing the typical pink or purple colouration seen. The gold was unaffected by the parting process and could be retrieved and melted down, while the ‘cement’ could be smelted to reclaim the silver.

Three groups of early Roman parting vessels come from southern Britain (Fig. 15.5). The first group to be identified, by Mavis Bimson, were wheel-thrown, lidded vessels from the City of London which date to the later Flavian period (c. AD 75–80) (Marsden 1975, 100–1). A second group, of hand-made, hemispherical parting vessels with an external ‘glaze’, come from Frienhay Street, Exeter and probably date to the 2nd century, though they could be residual in the ditch in which they were found and thus earlier (Bayley 2001).

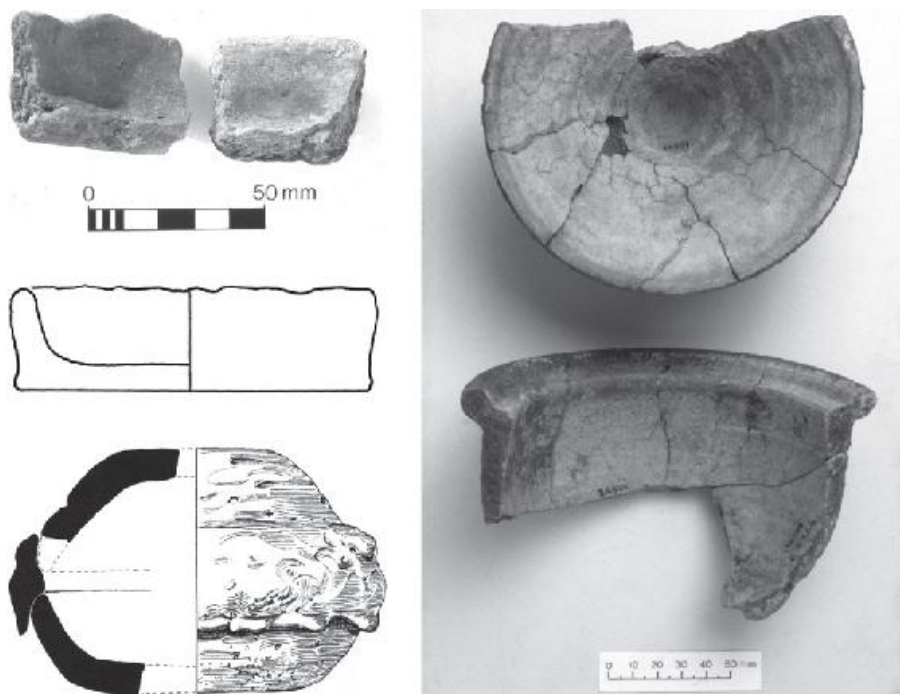


Fig. 15.5: Early Roman parting vessels from London (right, diam. 150mm), Exeter (bottom left, diam. c. 150mm, drawing: Judith Dobie) and Chichester (top and centre left, reconstructed diam. c. 125mm). (Photographs ©Historic England).

The third group are from mid-late 1st century contexts in Chichester. They were initially misidentified (Bayley 1978) but further

scientific analyses have now identified them as parting vessels (Bayley 2009). From the same contexts there are also crucibles initially identified as containing red enamel (Bayley 1978) but now known to have been used for smelting and refining the silver-rich 'cement' from the parting vessels. The copper the 'cement' contained was separated from the silver by adding lead which reacted with it, forming a red lead-rich crucible slag. A similar process has been identified at Xanten where small crucibles containing red glassy slags were also found (Rehren and Kraus 1999).

Case Study 4. Metalworking in and around Verulamium

Metalworking was identified by Frere (1972, 11 and 18; figs 8 and 10) in his excavation of a row of strip buildings fronting onto Watling Street that were used as shops and workshops (Fig. 15.6). The activity continued through two periods of occupation from the mid-1st until the early 2nd century. The finds included many crucibles and copper alloy scrap and waste. There were also the remains of wooden boxes sunk into the floor by the workbenches that were filled with fine copper alloy turnings and filings that had been collected and were presumably destined for re-melting; this suggests wrought metalworking as well as casting was carried out here.

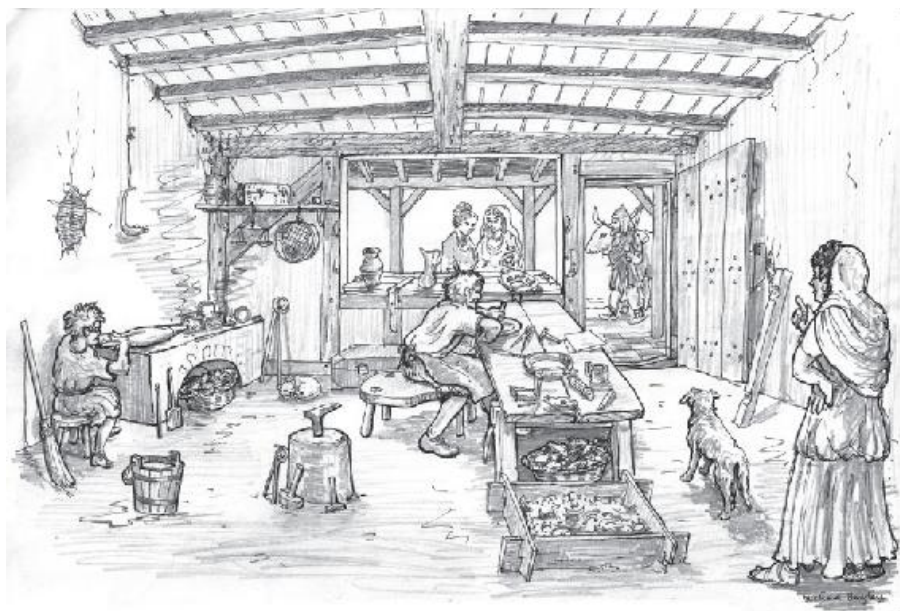


Fig. 15.6: Reconstruction of one of the Verulamium workshops (drawing: Michael Bayley).

Re-examination of the crucibles (Bayley 1991b) identified both hand-made and wheel-thrown forms, the latter from the later part of

the sequence. Most were used for melting copper alloys but there were a number of small shallow vessels that were used to melt precious metals, either silver or gold. The metal had been allowed to solidify in the crucibles so was probably intended for wrought working and may have originated as scrap metal that was being recycled. A few somewhat larger shallow crucibles had traces of silver, but also lead, on them and appear to have been used for refining silver by cupellation.

The nearby villa at Gorhambury also produced evidence of metalworking from 1st- to 2nd-century contexts. The finds include some small copper alloy spillages as well as hand-made crucibles used to melt copper alloy, silver and gold (Bayley 1990). One of the crucibles with traces of gold is similar to the gold-melting crucibles from Verulamium described above.

Further north-east at Baldock and at Braughing there is also good evidence for copper alloy working. At Baldock there are part-made wrought one-piece Colchester brooches made of brass as well as about 20 wheel-thrown beaker-form crucibles with added outer layers like those from Verulamium (Bayley 1986b, 385–6); this form is common on sites across Britain. At Braughing strip buildings along Ermine Street were identified as ‘bronze’ workshops with similar crucibles and a ?mould (Potter and Trow 1988, 10 and 93).

Conclusions

Metalworking in southern Britain is in many ways no different from that in the rest of the Roman province of *Britannia*. There are metalworking finds from forts, vici, towns, villas and other small settlements, a dispersal of activity that is typical of the Roman period (Bayley 1998b, 164). It is thus not surprising that almost all the secondary non-ferrous metalworking processes that have been identified in Roman Britain are represented in this area. Those that are missing or are poorly represented are the least common or least easily recognised so it is possible that further scientific examination of old finds will discover examples; new excavations, where small and apparently insignificant finds are retained, are another possible source to fill these gaps.

Who the metalworkers were is a further question that can be asked, though the evidence only suggests they were as varied in background as the sites where they worked. Some would have been working for the army, or under official control, while many must have been

members of the civilian population, both native Britons and immigrants from other parts of the Roman world. Some of the processes they used required careful control and would therefore only have been carried out by skilled craftsmen, but more basic metalworking could be carried out by any practical DIY enthusiast, which perhaps begins to explain the very varied quality of the Roman metalwork found by archaeologists.

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Chapter 16

Clay, Water, Fuel: An Overview of Pottery Production in and Around Early Roman London

Louise Rayner

Introduction

This chapter considers the supply of pottery to early Roman London and examines some of the key pottery industries which contributed significantly to the pottery vessels in use in Roman London in the 1st and 2nd centuries. The foundation stones for the study of early Roman pottery in London remain two publications that resulted from the prolific work of the Department for Urban Archaeology (DUA) and Department for Greater London Archaeology (DGLA) in the 1970s and 80s. *The Roman Pottery from Southwark* (Marsh and Tyers 1979) summarises key industries supplying pottery to Southwark, as well as outlining a form type-series that remains the core of the system still in use in London. *A dated corpus of early Roman pottery from the City of London* (Davies *et al.* 1994) presents fabrics and forms across all key ware groups found in London and the analysis of a series of Roman Ceramic Phases (RCP) which examine assemblages in chronological groups and considers the changing composition and sources over time. This paper does not attempt to duplicate the breadth and detail of these two publications but instead to bring together more recent findings and flag new research and publications.

In particular, the evidence for production at the Highgate Wood and Brockley Hill/Verulamium industries will be considered including their location, resources, kiln technology, and the extent and nature of the archaeological evidence for each of these industries, as well as the products themselves (Fig. 16.1). The development of these industries will be considered against the backdrop of pre-Roman late Iron Age ceramic traditions. Evidence for pottery production within Roman London will also be explored and through these studies it is hoped we will review critically the evidence we have for the production of so many vessels – beyond the pots themselves.

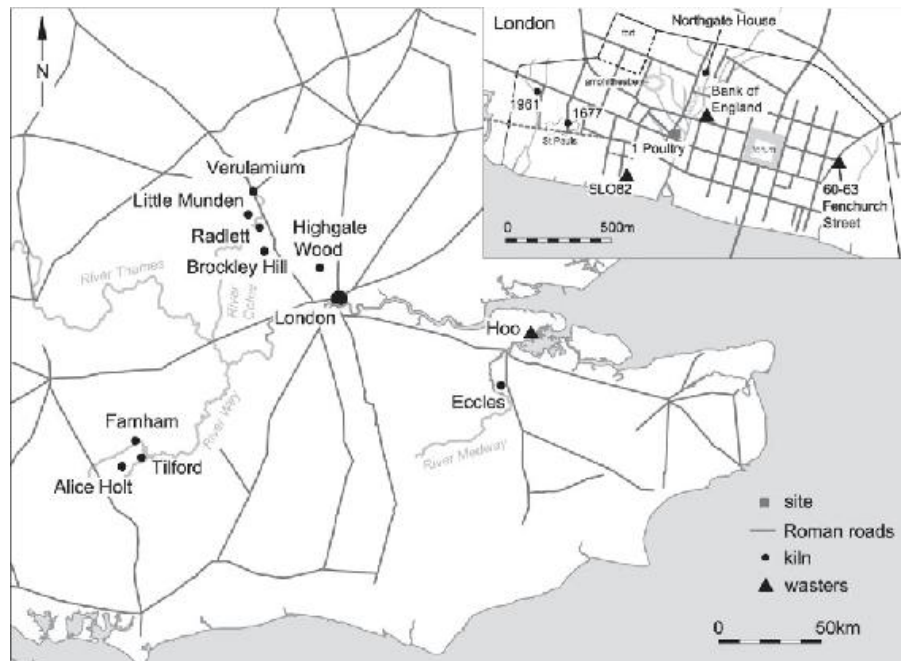


Fig. 16.1: Location of key sites.

The late Iron Age context of pottery production in south-eastern Britain

Any attempt to explore and understand the origins of these early Roman pottery industries must take into consideration the nature of pre-Roman late Iron Age pottery in the years running up to and including the Roman conquest. The picture varies from region to region in detail but there was a broad development from hand-made jars and bowls, in fabrics relatively coarsely tempered with a range of inclusion such as shell, organics, flint, grog, and sand, which have their origins in the middle Iron Age, to the introduction of wheel-made pottery sometime from 150 BC, and the appearance of ‘Belgic’ or ‘Aylesford-Swarling’ type vessels in parts of Hertfordshire, Essex, Kent and West Sussex. These two traditions, however, were not exclusive and hand-made vessels in the ‘native’ tradition continued in use alongside the Belgic-style wheel-made ones. Hand-made forms are mainly simple with bead-rimmed, plain-rimmed, and S-shaped vessels and with a limited range of diameter-to-height ratios achieved by the hand-building method (Tyers 1996b, 56; Hill 2002, 143–5).

‘Belgic’ style pottery is present in much of our region from the 1st century BC. It is usually grog-tempered and often well-made in curving forms with cordons and carinations and a greater range of

vessel height-to-diameter ratio achieved through the use of the wheel. Clearly contact with north-east Gaul, including the importation of pottery vessels and possibly potters themselves bringing the new technology, was a major influence in the cultural changes evident in these areas. These developments introduced completely new forms into the Iron Age repertoire with the appearance for the first time of functionally specific tablewares such as cups, flagons, platters, and beakers.

Against this broad backdrop, in considering Roman London, we must recall that there is no evidence for significant pre-Roman settlement in the central core and the site of Roman London at the time of foundation is still largely thought to have been unoccupied. Certainly there is no evidence for a significant pre-Roman late Iron Age presence north of the river, although there are increasing hints of small-scale settlement south of the Thames, particularly on the Bermondsey eyot, that probably pre-date the Roman conquest (Rayner 2009, 38–40; Rayner 2002, 16–18). Dating these groups with finer resolution is problematic due to the paucity of stratified assemblages but the presence of substantial sherds, vessel fragments, and other domestic objects, such as a triangular clay weight, hints at some sort of settlement in the vicinity.

The material from the Bermondsey eyot forms part of a growing collection of vessels, from both central London areas and more widely from across Greater London, with traits and characteristics of pre-Roman late Iron Age ceramic traditions, whether of a pre- or post-conquest date. A handful of early pre-AD 50 pottery assemblages from the wider London region have been summarised by Paul Tyers (1996a). These groups from Brentford, Highgate Wood and Park Street, Southwark all feature simple bead-rimmed jars in vesicular/organic or shell-tempered fabrics alongside finer, thin-walled, grog-tempered Belgic-style vessels. Aside from the Highgate group, the source of the pottery in these early groups is not known and we have no direct evidence for the technology used in their manufacture, beyond what can be surmised from the pots themselves.

Whilst there has been increasing interest in such material, as part of a broader growing interest in London's pre-Roman story, and consequently improved identification and publication, the small and often isolated nature of assemblages means it is still difficult to ascertain what is typical for the London region. Not surprisingly, the individual vessels and assemblages recovered display ceramic traits of

several adjacent regions, reflecting the location of London at the boundaries of several Iron Age tribal areas, with material being drawn from a variety of neighbouring regions including Hertfordshire, Essex, East Sussex and Kent (Tyers 1996a; Rayner 2002, 16–18; Rayner 2009, 38–40).

If we turn to the evidence for production specifically, aside from the pottery vessels themselves, what do we have in our region for pre-Roman production? In fact, the evidence for the making and firing of pottery in Britain before the Roman conquest is scarce, presumably mainly due to the ephemeral nature of the firing process either in surface bonfires or shallow pit-clamps (Swan 1984, 53) and even where sites of repeated burning are identified it can be difficult to associate these directly or exclusively with pottery firing.

Vivien Swan's book, *The pottery kilns of Roman Britain*, although first published in 1984, is still the most comprehensive survey of production sites and kilns to have been produced, although is obviously now out of date in terms of find spots. In this, Swan states that 'Exactly when the most rudimentary kiln technology became established in Britain is not yet certain. Out of a small group of possibly pre-Roman kilns, the number definitely so is minimal. In most instances it is impossible to determine whether pre- or immediately post-conquest dating is appropriate' (1984, 56).

This small group of possible pre-Roman kilns are simple updraught surface or semi-sunken kilns of pre- and post-Conquest date, such as the examples from Mucking in Essex, Upchurch Marshes in Kent and further afield in the Nene Valley and Derbyshire, amongst others (Swan 1984, 55), but none are known from closer to London.

Roman London and its pottery supply

The chronology and character of the foundation of Roman London has long been a subject of much study and debate, but has recently received renewed attention due to the discoveries at, and subsequent publication of, large-scale excavations in the City and south of the Thames in Southwark. These have prompted the development of new interpretations – based on both published and unpublished evidence – which present alternative models for the nature and character of Roman London's origins and particularly the presence or otherwise of a military installation (Bird 2002, 259–60; Perring 2011; Perring 2015; Wallace 2013). Current evidence suggests Roman London was founded a few years earlier than the previously accepted date of AD

50, with the recovery at 1 Poultry of a timber, with a tree-ring date of winter AD 47/48, from a cross-drain associated with the construction of the main western approach road (Hill and Rowsome 2011, 256–60; Perring 2011, 250–3).

It is clear from the earliest pottery assemblages associated with the creation of Roman London's infrastructure that romanised vessels are in use in the settlement from the outset. In this earliest period, the pottery was drawn from a large number of sources (Fig. 16.1). Imported vessels form a significant component of these assemblages, particularly fine drinking and table wares, composed of Neronian samian ware and a selection of other continental fine wares (Davies *et al.* 1994, 166–7; Pitts 2014, 143). The more utilitarian components such as jars and bowls are most commonly Romano-British produced wares, many of unknown source but including vessels from Highgate Wood (Middlesex), Alice Holt (Surrey) and north Kent (Davies *et al.* 1994, 168). Oxidised wares in the romanised forms of flagons and mortaria are also sourced from Kent (including production at Eccles and Hoo Island), with products from the Verulamium region appearing by c. AD 55, but apparently absent from the very earliest levels (Davies *et al.* 1994, 168). The industries at north Kent, Alice Holt, Highgate Wood and the Verulamium region remain major suppliers until the mid-2nd century, when patterns of production and supply undergo significant changes.

Roman pottery industries

The basic requirements for pottery production are the availability of suitable clay, tempering material, water and fuel (Swan 1984, 3) and to make mass production worthwhile, the existence of potential local markets and a means of transportation are also important. Clearly the establishment of *Londinium* would have been a market of significant potential, with a number of pottery industries being established within reach of the city and where the required raw material could also be exploited.

A number of pottery industries were located close to London and became important suppliers in the 1st and 2nd centuries. Two of them, Highgate Wood and the Verulamium region, are discussed further below. The third industry was located at Alice Holt Forest and the surrounding area along the Surrey-Hampshire border and around Farnham and Tilford, just inside the county of Surrey (Lyne and Jefferies 1979), a series of workshops collectively referred to as the

Alice Holt/Farnham

Located on the Gault clay, the potters made use of this clay resource to produce a range of reduced grey-ware vessels, predominately jars, dishes and bowls but also flagons, beakers and lids, with production dating from around, or before, the Roman conquest through to at least the first quarter of the 4th century (Lyne and Jefferies 1979; Lyne 2012). Pottery assemblages from the recent excavations at Silchester do indicate a pre-conquest origin for the Alice Holt potteries, with butt-beaker copies, platters, bead-rimmed jars and necked bowls amongst the early products. The vessels were manufactured in a black, more granular fabric than the grey wares that became the standard of this industry post-conquest (Timby 2013, 161). The early grey-ware products are abundant in mid-1st and mid-2nd century London assemblages (for examples see Fig. 16.2), which along with Highgate Wood vessels (see below) dominate the supply of jars and bowls, peaking in the Trajanic period (Davies *et al.* 1994, 97).

Unfortunately, no well-preserved 1st- or 2nd-century kilns have been discovered, but vessels of this date have been identified in waster dumps across the Alice Holt complex (*ibid.*, 17), and of course identified in consumption assemblages across Surrey, Hampshire and in London (Davies *et al.* 1994, 97–9). Excavations at Alice Holt waster dump AH.5 in 1974 did encounter some fragments of kilns of late 1st-century date, although only a small area was seen and the layering of kiln structures is difficult to untangle (Lyne 2012, 133). Two kilns include a circular pit and the use of clay blocks, but the number of flues and their location is not clear.

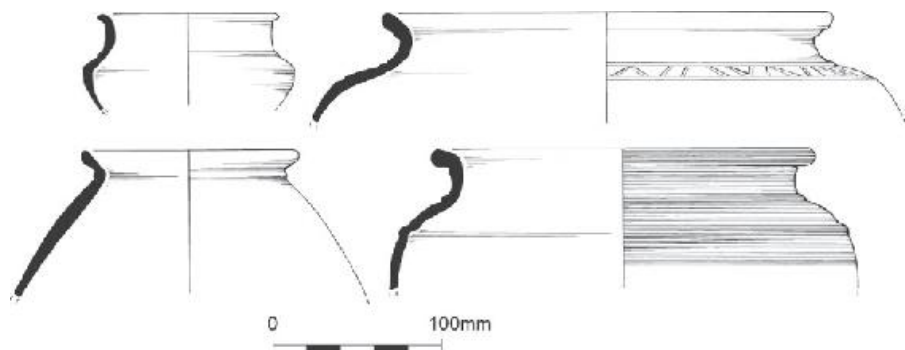


Fig. 16.2: Selection of early Alice Holt/Surrey vessels found in London (©Museum of London Archaeology).

The later industry is associated with distinctive double-flue updraught kilns which appear to come into use from the late 2nd/

early 3rd century and well-preserved examples are published from Farnham (Falkner 1907), Tilford (Clark 1950) and more recently, along the A325 at Alice Holt Forest (Birbeck *et al.* 2008), and at Groom's Farm (Cooke and Powell 2014), and Osborne Farm, Kingsley (Anelay and Timby 2014).

Highgate Wood

Located in Highgate Wood, some 10km (5–6 miles) north-west of the Roman city, ten kilns and associated features were excavated in the late 1960s and early 1970s following the initial discovery in 1962. Highgate Wood forms part of the ancient Middlesex Forest and the underlying geology comprises London Clay with pockets of sand and gravel. The site lies within an area bounded on the west by Watling Street and on the east by Ermine Street (Brown and Sheldon 1969, 39). The final publication report on this important kiln site has now been completed and readers are directed to both the published report and digital archive (Brown and Sheldon forthcoming). Consequently, only a summary of the kiln site and its products is presented here.

As revealed through several seasons of excavation, the area included ten kilns along with waster heaps, a series of ditches for water management and pits relating to the preparation of clay, and evidence for four very slight wooden structures, not all of which were in use at the same time as the site was in episodic use from the mid-1st to mid-2nd centuries AD and clearly developed over a series of phases of use (Fig. 16.3; Brown and Sheldon 1974; Brown and Sheldon forthcoming). Over two tons of pottery was recovered during the excavation (Brown and Sheldon 1969, 43). The clay was presumably sourced locally to the site, although no pits large enough to suggest extraction have been revealed in the area excavated to date.

The kilns and associated assemblages excavated at Highgate represent an important industry that supplied reduced wares to London from the mid-1st to mid-2nd centuries AD. Over this period, the transition from predominately hand-made native and Belgic-style vessels to highly romanised wheel-thrown wares can be seen, with an early coarse vesicular ware (known as HWA) and grog-tempered fabric (HWB) used for native and 'Belgic' style jars, beakers and bowls from c. AD 50/55 (Tyers forthcoming, phase 1) progressing into romanised sand-tempered grey wares (HWB/C, HWC), which were produced from AD 70 through to the mid-2nd century (Fig. 16.4: Tyers forthcoming, phases 3 and 4).

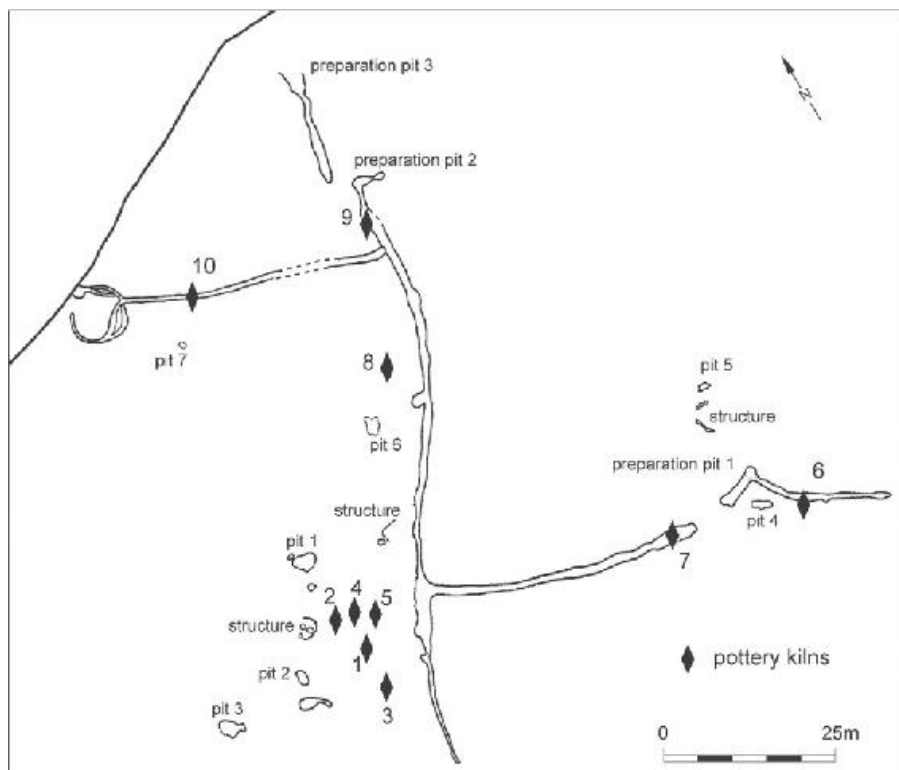


Fig. 16.3: Plan of excavations at Highgate Wood.

Grog-tempered wares (HWB), predominately in jar and hooked-rimmed bowl forms (Tyers forthcoming, phase 2; Brown and Sheldon 1974, 227), were found associated with oval and twin-flued kilns set into the ditches towards the top of the hill, to the south of the site (*ibid.*, fig. 1: kilns 6 and 7, 10).

These earliest assemblages demonstrate continuity with essentially pre-Roman traditions of manufacture and style into the post-conquest period (Davies *et al.* 1994, 74) and these early potters are suggested to be native craftsman set up to supply the markets in pre-Boudican London with predominately utilitarian cooking and storage vessels (Brown and Sheldon 1974, 224).

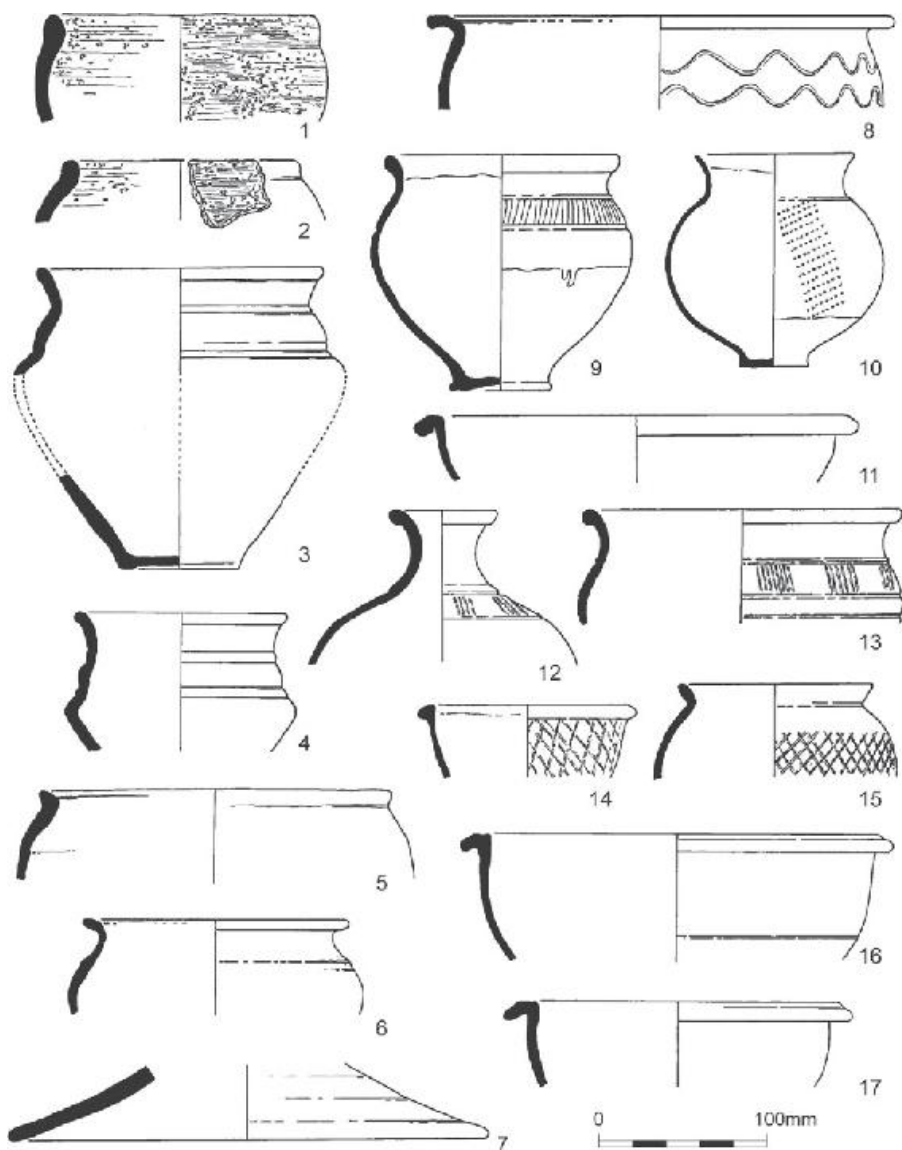


Fig. 16.4: Selection of vessels produced at Highgate Wood (HWA: 1–4; HWB 5–8; HWC 9–17). (Drawn by P. A. Tyers).

The later grey sandy wares, which are wheel-made and more romanised in form, coincide with a development in kiln technology, with a number of updraught chambered kilns uncovered, which are dated c. AD 100–140 (for example kiln 5, [Fig. 16.5](#)). These later kilns share a number of characteristics, although they also exhibit variation in detail: the kilns were built on or slightly cut into the clay subsoil, the furnaces and pedestals were constructed of baked clay, some of which have evidence for pre-fabricated clay wall segments (although method of floor support varies), the furnaces were all circular or

roughly oval, flues were all orientated south-west (Brown and Sheldon 1969, 40–3).

The vessels associated with these later kilns were predominately jars, bowls and lids, but also with fine beakers and flasks in the repertoire. The overall importance of this industry can be seen in the quantification of data presented in the early Roman corpus (Davies *et al.* 1994, 74) where fabrics from Highgate Wood account for 33 per cent (by weight) of all reduced wares in the pre-Boudican ceramic phase and 45 per cent of all reduced wares in the post-Boudican late Neronian/early Flavian period, declining to around 24 per cent by the mid-2nd century.



Fig. 16.5: Highgate Wood kiln 5 (photograph: Bernard Brandham).

The interim reports suggested, and this is supported by the more recent analysis carried out for the final report, that the kilns were worked by itinerant potters – and not necessarily visited every year – due to the absence of permanent associated settlement and the relatively small scale of production, but yet with vessels found

covering a period of some 100 years. Given the large contribution this industry appears to have made to London's pottery supply, it has been suggested that further kilns and workshops of Highgate Wood type might be found in the area, with potters visiting a number of sites for a season or two before moving on, the sites forming a dispersed but related area of pottery production (Orton 2002, 19–20).

Fuel in the form of charcoal is evidenced in the kilns including examples of oak, hornbeam, and hawthorn which are still the major woodland species on the site today. The potters at Highgate are likely to have made use of a variety of fuel resources from the woodland including coppiced wood and cordwood and it is suggested that they were part of an efficient system of woodland management in the hinterland of *Londinium* (Brown and Sheldon forthcoming).

The Verulamium Region industry

A second industry of significance to Roman London comprised a series of workshops and kilns located on Watling Street between Brockley Hill and Verulamium with centres at Brockley Hill, Radlett, Verulam Hill Field and Bricket Wood – these are collectively known as the Verulamium Region industry. Most of these kilns are dated to the 1st–2nd centuries, and they produced a highly standardised series of vessels, dominated by flagons and mortaria, suggesting they form a unified industry. The kilns at Brockley Hill are the closest to London, located some 12 miles north of the City, with St Albans eight miles further to the north along Watling Street. Brockley Hill has also produced material relating to the earliest phase of this industry, of Claudian or early Neronian date (Tyers 1998, 292). A kiln and associated debris of the mortaria potter Oastrius at Bricket Wood is also dated to c. AD 55–70 (Saunders and Havercroft 1977). The predominately oxidised products of this industry were manufactured exploiting outcrops of light-firing clays of the Reading Beds (Vince and Tomber 2005, 175).

The fieldwork that uncovered the majority of evidence related to this industry largely took place in the late 1930s–mid-1950s and late 1960s and mid-1970s and has been published in a series of articles in local and county journals (Marsh and Tyers 1979, 534–5 provides a comprehensive gazetteer and bibliography of the known kilns). The kilns of Brockley Hill have been the most extensively excavated. Much of this was carried out in the 1970s but a developer-funded excavation in 2000 located another kiln and quantity of pottery (Smith *et al.* 2008). At Brockley Hill the earliest kiln-associated material, from a

pit, was dated to the AD 50s by association with samian and coins (Castle 1973; Tyers 1998). The earliest dated kiln from this industry is at Little Munden, dated to AD 55–75 (Saunders and Havercroft 1977); although it is suggested that the Brockley Hill group is slightly earlier with production commencing around AD 50 (Bird 2005, 22).

As Bird has already suggested, the location of Brockley Hill and the other kilns of the Verulamium region, at around the same time as the foundation of London and construction of Watling Street, implies a close relationship between the two, with the industry supplying highly romanised forms to the new city and making use of the new road system in order to transport substantial numbers of vessels to this market (Bird 2005, 23).

The importance of the supply of the wares from the Verulamium Region industry to early Roman London cannot be overstated, although in recent years the picture has become more complex (see below). Whilst evidence from pre-Boudican levels in London has long suggested that the Verulamium white wares were common by c. AD 55/60 (Davies *et al.* 1994, 168), small quantities of vessels were in circulation earlier than this, as evidenced, for example, by sherds from 1 Poultry in assemblages associated with the construction of the early road system (Rayner 2011, 272), where associated dumping is dated by dendrochronology to the years AD 53–5 (Hill and Rowsome 2011, 263–72).

In general, for the pre-Boudican period (Davies *et al.* 1994, 167–8: Roman Ceramic Phase 1A) Verulamium Region wares account for 22 per cent of all oxidised wares; by the late Neronian – early Flavian period (Davies *et al.* 1994, 186: Roman Ceramic Phase 1B) this has risen to 72 per cent of all oxidised wares and correspondingly most other early oxidised wares have declined. By the Flavian period (Davies *et al.* 1994, 192–5: Roman Ceramic Phase 2), the ware accounts for over 75 per cent of all oxidised wares – a picture of dominance unmatched by any of the other ware types present in London in this early period – and is maintained through the Trajanic period (Davies *et al.* 1994, 203: Roman Ceramic Phase 3). Following the discovery in 1999 and 2000 of kilns producing Verulamium Region white ware type vessels (amongst other wares) at Northgate House, Moorgate in the City of London, from c. AD 110, the question of supply from the Verulamium Region industry in the early–mid-2nd century has become more complex (see below for further discussion).

The kilns of the Verulamium Region industry

Much of the industry is defined by large collections of wasters, kiln debris and pits with potters' clay, although often without kiln structures directly associated. The earliest recorded kiln is at Little Munden Farm, Bricket Wood, with a shallow-set rectangular chamber with rectangular tongues and side piers all of tiles and all bonded with clay. The flue was walled and possibly corbelled with tiles – a common feature of the kilns of the Verulamium Region industry (Swan 1984, 98). Although it is not certain whether the tiles were made alongside pottery or at separate tile factories, there is clearly a close relationship between the two.

In general, despite reasonable amounts of fieldwork, we still have a poor understanding of the associated kilns used by the Verulamium Region industry. Much of the fieldwork was carried out under rescue or salvage conditions so only small areas were seen; at Brockley Hill it appears kilns were demolished, possibly because many were very shallow as seen at Bricket Wood. As more or less surface kilns, these have to be levelled in order for re-building or re-use of the site, rather than simply backfilled (Swan 1984, 98). So although at Brockley Hill some 14 kilns have been identified, now located within a scheduled monument zone, detailed understanding of the structures is lacking. Where sufficient of the kiln structures has survived, the main type in the 1st–early 2nd centuries was oval or circular with a narrow tongue support and solid-clay vented floor, although it is these latter elements that survive more rarely.

In 2000, Oxford Archaeology undertook a planning-led excavation at Brockley Hill House which revealed a further kiln, although this was also heavily truncated by later features, two large pits presumed to be for clay extraction, and Verulamium-type pottery which accounted for 88 per cent by sherd count of the 10,200 sherds recovered (Smith *et al.* 2008). No actual wasters were present although much of the pottery had a patchy surface finish, possibly due to poor control of kiln temperatures, and other sherds were poorly finished and overfired. Their discard, though imperfect or 'seconds' but still usable vessels, suggests a high level of quality control being carried out (Brown 2008, 90).

Charcoal analysis from this excavation has shed some light on our understanding of the use of fuel, at least at this Brockley Hill kiln. Samples within the kiln were mainly oak heartwood with some willow, maple, alder, hazel, hawthorn, blackthorn and ash roundwood. Oak was present consistently across samples, using fairly

wide roundwood, which suggests slow-growing trees of considerable age. The other species may have been associated with the kiln superstructure collapse (Gale 2008, 104–6). The presence of oak wood is perhaps not surprising given the location of the kilns on the wooded London Clay (Bird 1996, 226) but the presence of logs or billets of mature oak wood obtained from slow-growing trees is a useful addition to the data on kiln fuel (Gale 2008, 107).

The Verulamium Region industry specialised in oxidised flagons and mortaria but also produced bowls, jars and amphorae – highly romanised forms, which given the early date of inception are most likely to have been manufactured by immigrant potters (Swan 1984, 97–8; see Tyers 1998 for discussion of the origins of the early potters). It is suggested that the industry was established to supply pottery to the growing market for ‘continental-types’ and possibly even to fulfil military contracts particularly for vessels such as mortaria, for which there was no precedent in the pre-Roman period and which native potters would be completely unaccustomed to producing.

The mortaria in particular achieved a nationwide distribution and in the northern military zone in the 1st century the bulk of mortaria came from this industry. The steady military demand was clearly part of the underlying success of these potteries which was maintained until into the early 2nd century when apparent movement of potters from Brockley Hill to Hartshill/Mancetter signalled the loss of the northern mortaria markets. Other potters left to work in the Oxfordshire region (Hartley 2005, 114) and the mortaria stamp evidence from Northgate House suggests that the movement of potters to London is also possible, which given the other evidence of links between the two industries seems likely (*ibid.*, 96–102). The latest kilns of the Verulamium Region industry are structurally different and located immediately south of Verulamium itself, further indication of an industry undergoing change, with the potteries apparently moving closer to their local markets (Swan 1984, 98).

Evidence from the city of London

Evidence for pottery production within the urban centre was relatively piecemeal and inconclusive until more recent excavations discovered the presence of kilns in the Walbrook Valley and provided a focus for an industry previously represented only by pottery wasters and vessels. It seems likely that both in the Walbrook valley and to the west between Newgate Street and St Paul’s, significant other evidence

– of which only glimpses have been seen – has been lost through truncation by later developments or destroyed unrecorded.

Around St Paul's

The earliest record of evidence for production within the Roman city dates from 1677, when four kilns were uncovered during rebuilding of St Paul's Cathedral (various publications cite the date of 1672 for this discovery; the publication *St Paul's Cathedral before Wren* (Schofield 2011) presents the most recent and comprehensive consideration of this evidence, with John Schofield concluding that a date of 1677 is most likely (*ibid.*, 34)). From the surviving notes and sketches, the kilns appear to be of the updraught type with a vented floor, arranged around a single central stokehole, which is an unusual construction, although the records are limited and difficult to interpret. A drawing of pottery vessels does survive and these have previously been linked to the kiln, but were re-assessed by Robin Symonds and thought more likely to relate to other excavations (Schofield 2011, 35; *contra* Marsden 1969). Full analysis of the Northgate House, Moorgate production site (see below) has demonstrated that items such as the unguentaria/amphora stoppers and lamps shown amongst the pottery drawings and suggested by Symonds 'most likely to have been imported from sources outside Britain' are part of the repertoire of vessels being produced in the Walbrook valley and therefore do not necessarily need to be excluded as possible kiln products. The 'poppy-head' beakers can now also be paralleled in the Moorgate assemblage and do not necessarily have to be Highgate Wood products as suggested (Schofield 2011, 35), and the flagons, mortaria and plain jars are typical forms in the Moorgate assemblage. In the absence of the vessels themselves, attribution based on drawings is always going to be problematic but it may be that the pottery portrayed is more likely to be kiln products than the 2011 publication suggests.

In 1961, a further kiln was found just to the north of St Paul's during the Paternoster Development Scheme, which was also an updraught type with a central pedestal and solid floor of clay bricks, with vent holes positioned around the edge rather than evenly across the floor. Pottery found with the clay dated to late 1st to early 2nd century (Marsden 1969, 42–4). As well as the St Paul's area, evidence for production in the Walbrook valley was found during the rebuilding of the Bank of England between 1926 and 1934, in the form of large quantities of London ware, and then in 1936 wasters were found at 1–4 Cophthall Close/20–28 Moorgate, including coarse reduced ware,

mica-dusted ware and London ware (see Marsh and Tyers 1976 for full summary).

Sugar Loaf Court ware

In 1982, further pottery production debris was discovered. Sugar Loaf Court ware (SLOW), named after the site on which the wasters and kiln debris were found, is a distinctive pre-Boudican pottery type (Davies *et al.* 1994, 29–34). The presence of wasters and kiln debris indicated local manufacture, although kiln structures were absent and it is not clear whether the material was actually manufactured at that location or simply dumped from a production site in the vicinity. The presence of associated burnt debris including fired clay suggests that whichever scenario, the material has not travelled far from the point of manufacture. The pottery is manufactured in the local London Clay and in firing colours range from deep red and orange occasionally through to a reduced dark grey.

The range of forms, including collar-rimmed flagons, shouldered jars, beakers, carinated bowls, hemi-spherical cups, mortaria and lids, places the vessels firmly within a continental tradition and probably involved migrant potters (Fig. 16.6). In Britain these forms are closely associated with military sites such as Wroxeter and Usk, but evidence for a direct military association to SLOW is still under debate and there are many aspects of the SLOW production that are still poorly understood.

Whatever its origin, SLOW has long-been recognised as an important pre-Boudican ware (Chadburn and Tyers 1984; Davies *et al.* 1994, 29). Significant quantities were recovered in the early phases at 1 Poultry and adjacent sites, including, importantly, vessels dumped into low timber revetments (specifically Structure 4) constructed in AD 53 to stabilise the main east–west road (Hill and Rowsome 2011, 264–5; Rayner 2011, 268). In the pre-Boudican Roman ceramic phase (RCP1A) it accounts for almost half of all oxidised wares, although it was acknowledged that this is inflated by the inclusion of the Sugar Loaf Court site data and that the distribution is variable (Davies *et al.* 1994, 168). As more recent analysis has demonstrated, this pattern of variability remains despite the increasing ceramic dataset excavated from across the City, and whilst it occurs in small quantities at most sites with Neronian activities, it seems (to date) to only account for larger proportions at sites associated with the nucleus of the early settlement east of the Walbrook at 5–12 Fenchurch Street (FEN83) and 168 Fenchurch Street (FEH95; Dunwoodie 2004) (see Rayner

2011, 268; Richardson 2004, 38–9) and to a lesser and probably related extent, those along the main east–west road (such as 1 Poultry and 72–75 Cheapside).

Oxidised wares at 60–63 Fenchurch Street

Excavation in 2001 at 60–63 Fenchurch Street, on the eastern slope of Cornhill, produced a significant group of oxidised wasters associated with pre-Boudican and post-Boudican levels including two hearths or clamp kilns (Birbeck and Schuster 2009). The successive hearth/kiln features were both truncated but the larger was sub-rectangular in plan, 1.00m long, 0.80m wide and 0.15m deep with steep sides and a flat base (*ibid.*, 14–15). Other details are scant, but the features had clearly undergone high-temperature heating as demonstrated by the deep red colour of the fired clay around the edges (*ibid.*, 14, fig. 8).

The pottery was recovered from a range of contexts but formed a homogenous group including overfired, warped, and cracked waster sherds, as well as underfired examples, indicative of pottery production in the immediate vicinity, perhaps related to the kiln/hearth features. The fabric is broadly comparable with the London/Local Oxidised fabric (Davies *et al.* 1994, 34–6: LOXI) and also has similarities with SLOW, although it is not exactly the same as either. It is likely to have been manufactured in local London Clay although to date no petrological or chemical studies have been undertaken. Traces of white slip are common, which is a feature absent from the current SLOW and LOXI repertoire. The forms present in this new Fenchurch Street group are a highly intriguing collection of SLOW-like collared flagons, plus ring-necked and disc-mouth flagons which also find little comparison in the known SLOW or LOXI repertoires (Fig. 16.7; Seager Smith 2009a, 15; 2009b, 55). Such forms are present however at other early post-conquest production sites such as at Eccles, and Hoo Island, both in Kent. White-slipped oxidised flagons, including both collar-rimmed and early ring-necked types, were present in the early Structure 4 assemblage at 1 Poultry (Rayner 2011, 272, fig. 259) and although not exactly matched in the published examples may originate from this source.

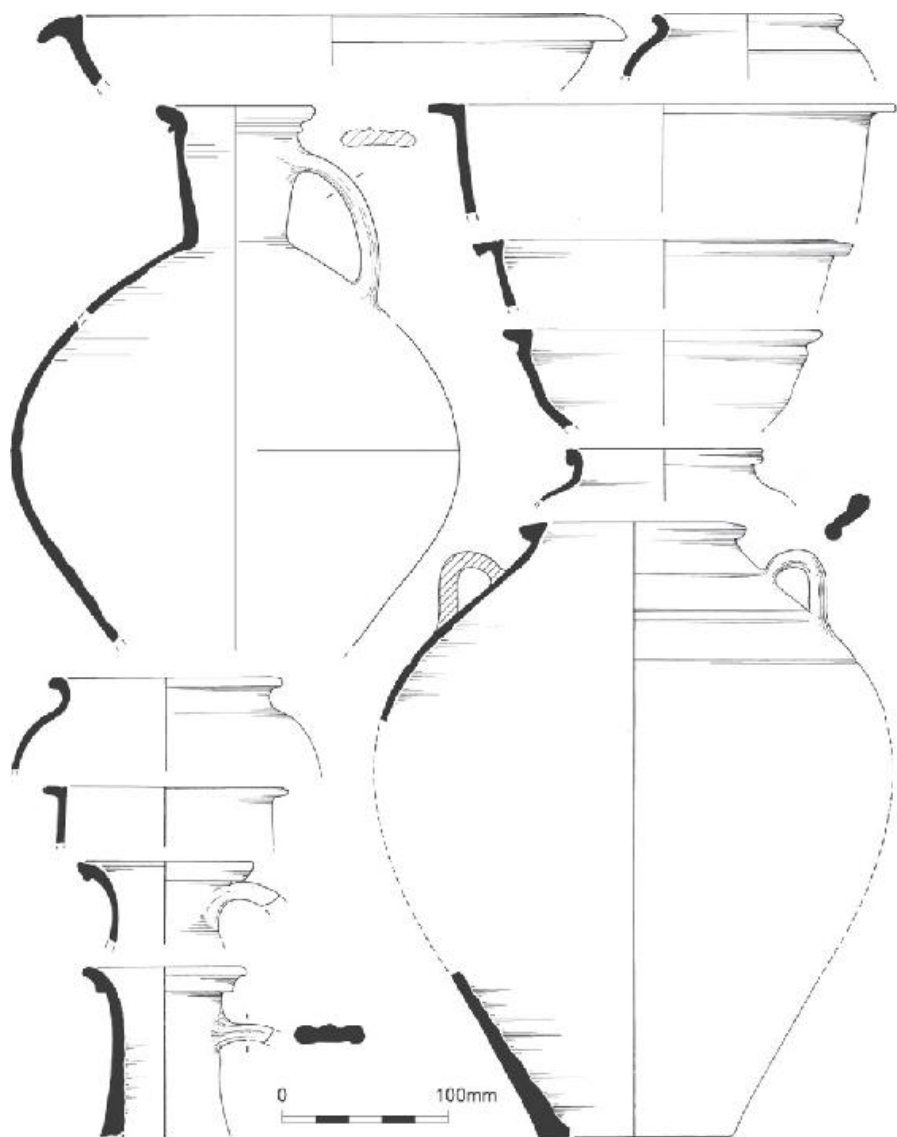


Fig. 16.6: Selection of vessels in Sugar Loaf Court ware (©Museum of London Archaeology).

The discovery of this waster group is intriguing, particularly given its similarities to the broadly contemporary Sugar Loaf Court ware (SLOW) and the slightly later London oxidised wares (LOXI). It remains to be seen whether examples will be positively identified amongst assemblages at other sites but the variety of production in the early post-conquest period is clearly more complex than previously thought.

Northgate House, Moorgate kilns

The earlier finds of pottery wasters at Copthall Close were thrown into

sharp relief in 1999–2000 when during excavations at 20–28 Moorgate, two kilns and associated pits and production debris were uncovered. These excavations are published in detail (Seeley and Drummond-Murray 2005) and only a summary is provided here.

Dating to the early 2nd century two large circular kilns were identified which have dramatically altered understanding of pottery production and supply in this period. Some 24,338 sherds were recovered associated with this period of activity on the site, of which 20,614 were deemed to be products related to the kilns (*ibid.*, 162).

Alongside local oxidised wares, local grey wares, (Cophthall Close grey ware), reduced London ware, and other mica-dusted, marbled and eggshell finewares, which had for some time been suggested as local London products, the major discovery was the presence of pottery wasters and vessels which to all intent and appearance were identical to Verulamium Region products including the distinctive white wares, as well as a range of similar Verulamium-type forms but in a mixed clay (*ibid.*, 84).

A detailed programme of petrological and chemical analysis was carried out with samples from both Northgate House kilns and Brockley Hill, which suggested that the whitewares were produced in clay exploited from the same Reading Beds as Brockley Hill and that, where used without further treatment or mixing, it was not possible to distinguish London samples from those from Brockley Hill. The red wares were produced in London Clay with characteristics of clay sourced in the London area and similar to the red-firing clay used at Brockley Hill to make red-bodied white-slipped wares (Vince and Tomber 2005).

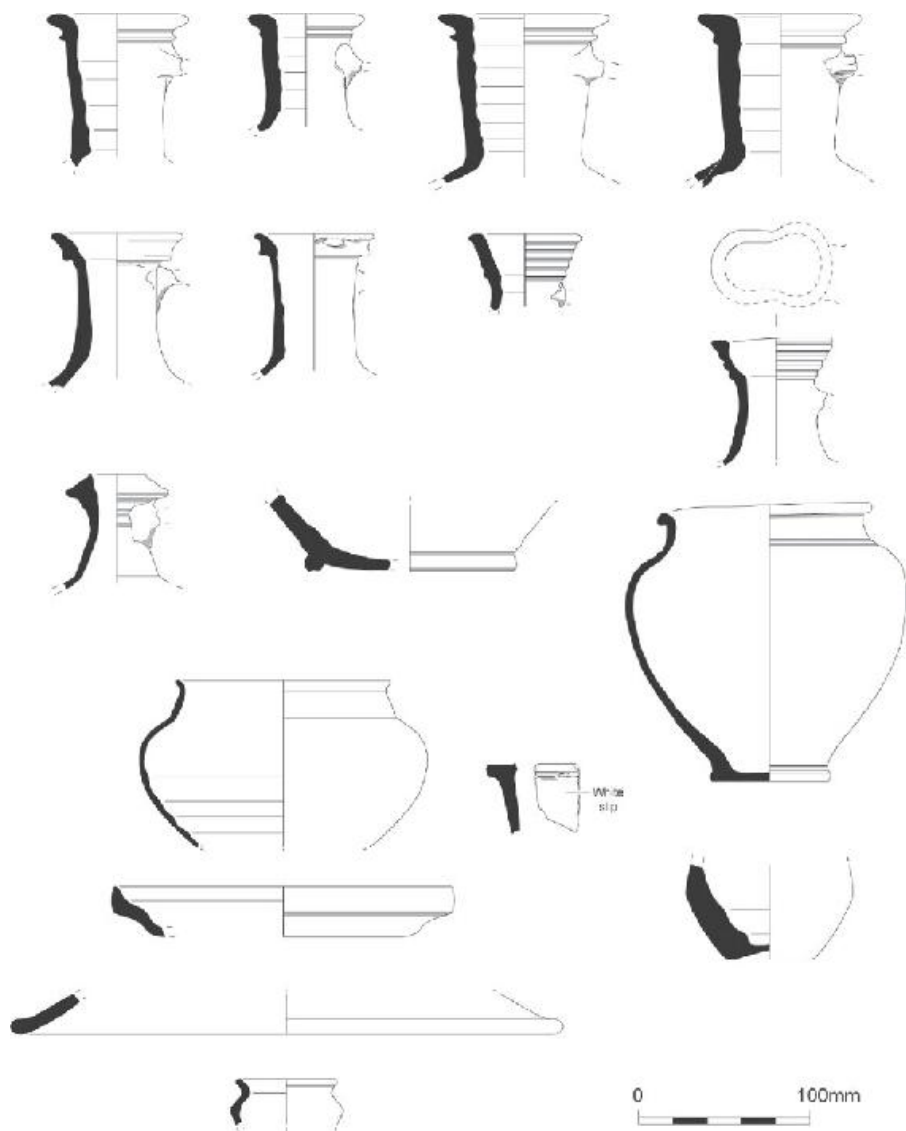


Fig. 16.7: Selection of vessels from 60–63 Fenchurch Street (©Wessex Archaeology).

The reduced wares were also manufactured using the secondary London Clay. Given that the Walbrook stream cuts the gravel terrace and clay, London Clay would have been available for extraction in the area. Water would also have been provided by the Walbrook stream, and wells were also identified on the site (Seeley and Drummond-Murray 2005, 137).

At least two circular kilns were excavated at Northgate House and related to the first phase of production (c. AD 110/20–40). Known as the ‘blue kiln’, one of them appeared to have been used for the firing

of reduced grey wares – or at least in its last firing – and seems to be the earliest kiln uncovered. A circular pit formed the furnace chamber which was lined with clay and retained a central support, a low internal ledge and corbels on the side to support the oven floor. The central support was constructed of sun-dried bricks. The oven floor was pierced with circular vents, some of which appear to have been covered with lids in the last firing. No evidence of the superstructure was found (*ibid.*, 15). The other circular or ‘red kiln’ also had a solid oven floor pierced by circular vents, but unusually the floor was supported by a single arch of prefabricated bricks resting on two pilasters attached to the kiln walls, with two additional arches from the back wall (*ibid.*, 19–21).

Fuel is evidenced by the presence of charcoal in the kilns and waster groups, which from identification suggests oak was the main fuel source, with smaller quantities of hazel, hawthorn, maple and birch. From the evidence, mainly branches and the tops of medium to large trees were used, perhaps indicating cooperation and coordination between different crafts and industries who might have been exploiting the same resource (*ibid.*, 138).

The discovery of this workshop, and the results of the characterisation studies suggesting that the light-firing clays of the Reading Beds were being imported from Brockley Hill to London for the production, raised important questions about the relationship between the two production sites (*ibid.*, 142–4). Aside from the clay and shared vessel repertoire, some of the mortaria stamps found on vessels at Northgate are of potters also known to have worked at Brockley Hill, and in two cases also at Radlett. This may indicate some movement of potters from Brockley Hill to London, although the evidence is inconclusive (see Hartley 2005, 100–2).

There are also some notable differences between the Northgate kilns and structures identified at Brockley Hill. At Northgate there is no evidence for the use of tiles in the structures, although this is frequently the case in Verulamium Region kilns, and at Brockley Hill the kilns are surface-built or shallow-sunken, whilst the Northgate kilns are set constructed in pits.

So what to make of these findings? The movement of mortaria makers from the Verulamium Region to the Mancetter/Hartshill potteries in Warwickshire at the turn of the 2nd century has been established through the detailed study of the potters’ stamps. The evidence from the Northgate kilns may suggest that, at a similar date,

potters from the Verulamium region also moved and set up in the Walbrook valley, probably to be closer to the important and expanding market in Roman London.

Understanding the relationship between these two industries is ongoing and further compositional and technological assessment of samples from Brockley Hill and Northgate has recently been undertaken as a postgraduate study (Amicone 2011; Amicone and Quinn 2015). A further 50 samples from Brockley Hill were analysed by thin section petrography and geochemistry (ED-XRF), as well as some raw material prospection, and compared to the thin sections and data from Northgate House. The study concluded that the Brockley Hill and Northgate House samples ‘contain a similar range of petrographic and elemental variability and exhibit some very good petrographic and geochemical matches’ and that macroscopically the pottery would be very difficult to distinguish (*ibid.*, 16–17).

The increasing complexity of production evidence in London is exemplified by three vessels recently published from Cheapside in the City of London (Howell 2013, fig. 15, <P11>–<P13>). From a group dated c. AD 60–80 are three reed-rimmed bowls: one in the Sugar Loaf Court fabric and two in unsourced oxidised wares, with a finish comparable to Verulamium Region white wares but notably made using mixed clays (Howell 2013, 15). These vessels have not been identified as London oxidised wares (LOXI), and in this group would pre-date the established date of manufacture taking place at the Northgate kilns; but the practice of mixing other clays with London brickearth was established in examples within the Northgate assemblage (Seeley and Drummond-Murray 2005, 115; Vince and Tomber 2005, 175). It is possible that these two reed-rimmed bowls in the mixed clay hint at another early pre-Flavian workshop, perhaps an earlier incarnation of the workshops located at Northgate House or possibly interaction with the potters working at Brockley Hill, used to working with the Reading Beds clay. Until more vessels are uncovered, we can only speculate as to their significance and mode of production, but the recent discoveries, coupled with the Fenchurch Street oxidised ware wasters, suggest that a review of early oxidised wares and re-examination of pre-Flavian assemblages may prove fruitful.

Conclusions

We have seen that the evidence for pottery production, even in these

few examples, is varied and complex and that even for important industries supplying London the archaeological evidence for the structures, workshops and associated features involved in the production of so many vessels, is often limited at best and in many cases patchy and inadequate.

It is also clear, that whilst resources such as clay and fuel were of fundamental importance and clearly the prime drivers for the location of kilns, other aspects such as the proximity to markets were also influential and may have encouraged the relocation of potters and even maybe workshops. Whilst the transportation of clay, as in the case of the Northgate House workshop, involved additional effort, it seems the desire to be close to the market was perhaps, at that point in time, enough to encourage relocation.

The Northgate House kilns and the Fenchurch Street oxidised waster groups demonstrate how new discoveries can significantly progress our understanding of this complex pattern of production and supply. New discoveries are being made all the time, adding new information to the already massive ceramic dataset in existence for Roman London. This dataset, both digital and the physical archives of pottery, continues to reap reward when studied, reviewed and re-examined, enabling new interpretations to be proposed and challenged. There is great scope for much more research and the study of Roman pottery in London would benefit greatly.

Acknowledgments

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Chapter 17

The Supply of Tile to Roman London

Ian M. Betts

... building materials are more important, and even, dare I say, interesting than you might think. They certainly help to make history in ways that don't often get mentioned in books ...

Bill Bryson. *At Home: A Short History of Private Life*, 2010, 283.

Early London tile production

One of the chief components of any finds assemblage in London is ceramic building material. Vast quantities of Roman tile (including brick) have been found in excavations in London. It is apparent that tile production began soon after the establishment of Roman London in c. AD 48. The majority of buildings constructed in the 1st century were of timber and daub construction, so most early tile is either tegula or imbrex roofing or brick, the latter often utilized in tiled hearths. There is however evidence from the building material for the presence of early masonry buildings. A number of sites have produced early hypocaust tiles, namely half-box flues, full box-flue tiles and notched wall tiles (*parietales*), as well as ceramic water pipes of 1st-century date (Pringle 2007, 205–7). These are most likely to derive from some sort of bath-house.

A small number of hypocaust tiles have been recovered from pre-Boudican Fire horizons, but the majority derive from buildings constructed in AD 70–160. After AD 70 urban development expanded, with the construction of private buildings alongside an ambitious public building programme (Rowsome, 2008, 27). Amongst the public buildings dating to this period are the Huggin Hill baths (Rowsome 1999), the forum-basilica, the amphitheatre and the so-called Governor's Palace.

It is highly likely that the majority of tiles used were either made in London using local brickearth deposits, or at tileries located nearby. The location of these London tileries has proved frustratingly elusive, but there is now evidence for production in the western half of the city (Fig. 17.1). There is no trace of any actual tile kilns but a mass of waste material, both over- and under-fired tile, and what appear to be

remnants of kiln structures show that there must have been kilns lying close by.



Fig. 17.1: Location of sites in London with wasters from tile production (drawn by Judit Peresztegi, ©MOLA).

Exploitation of local clay deposits also formed the basis of the Walbrook valley pottery industry which developed in the 2nd century (Seeley and Drummond-Murray 2005, 14–15), but the only connection with the building industry was the production of so-called lamp chimneys (Seeley and Drummond-Murray 2005, 56–7, fig. 84). These were set on the roof where they acted as a type of louver allowing smoke or stale air to escape from the building (O'Shea 2003, 36).

Tile wasters have been found in two areas: Paternoster Square north of St Paul's Cathedral (SLY00) and 120 Cheapside (CDP04) (both MOLA fabric group 2815) (Fig. 17.1). Four Roman pottery kilns were found in 1677 during the rebuilding of the Cathedral, and a further pottery kiln was recorded in 1961 during development of the Paternoster area immediately to the north (Marsden 1969, 40–2; see also Rayner, this volume). Two further kilns, of uncertain purpose, were found in the Paternoster area during excavations in 2000–1 along with significant quantities of waster material from the manufacture of roofing tile, brick and *tegula mammata* (Watson, 2006, 53, 76). This would suggest that both tile-makers and potters exploited the same brick clay sources present in the vicinity of Paternoster Square/St Paul's.

The other evidence for tile production lies in the Cheapside area to the east. This site is of particular significance as there are waster tiles

stamped PPBRILON, which confirm the presence of a procuratorial tile kiln operating in London (Betts 2014a).

Procuratorial stamped tile was used almost exclusively in London's major public buildings during the late 1st to early 2nd century. The stamps have been found associated with the second forum/basilica, the amphitheatre, the large public baths at Huggin Hill, the fort at Cripplegate and a major building complex in the Cannon Street area, the so-called 'Governor's Palace' (Betts 1995, 223, fig. 4). Recent work on the building material from Cannon Street suggests that at least part of the 'Palace' may be a bath-house to match that located at Huggin Hill on the opposite bank of the Walbrook (Betts 2014b).

The tiles used in London were not just coming from the official procuratorial tileworks. There are a small number of civilian tile stamps from London showing that various private tile-making concerns were taking advantage of the increasing demand for roofing tile and brick, particularly as London expanded in the late 1st to mid-2nd century. Rather oddly most civilian stamps are 'one-offs' represented by solitary examples (RIB 2489.14, 2489.16, 2489.19, 2489.34, 2489.37). This would suggest that only a small percentage of tiles made at civilian tileworks were stamped, perhaps a single tile representing each day's output.

Only one civilian tile manufacturer seems to have applied stamps to their products with any regularity (Fig. 17.2). Eight different stamp dies are currently known (RIB 2489.13-2489.14, Cloak Lane (CKL88), Upper Thames Street (VRY89), Kemble Street (BRU92)) most of which can be read as:

D(ecimi) M(...) Val (...) / D(ecimi) M(...) P(...) / (figlinae) tegul(arinae)

'Tile (kilns) of Decimus M ... Val ... (and) Decimus M ... P ...'

The third and fourth lines form a complicated monogram.

Most civilian tile kilns probably operated sometime between the late 1st and the mid-2nd century, although dating evidence is extremely sparse. The Decimus stamps are on relatively thin tegulae some of which have round nail holes added before firing. Thinner tegulae with nail holes do not seem to have been used in London until the mid-2nd century, so this may be the date of the tiliary making Decimus-stamped tile. If so their manufacture would have taken place after the procuratorial tiliary stopped production as there is no evidence for the manufacture of these tiles in London following the



Fig. 17.2: Civilian tile stamp from Cloak Lane, London (drawn by Ian Betts, ©MOLA).

Other early tile production

On most central London sites around 85–95 per cent of the assemblage comprises what is presumed to be locally-made red and orange tile (MOLA fabric group 2815), although tiles made from similar clays are found across Greater London as well as sites in neighbouring areas such as Hertfordshire, Essex and Surrey. It is the remaining 5–15 per cent which provide important evidence for the importation of tiles into London. The most distinctive of these imports are the yellow, white and cream tiles which can also be found on various sites in London, Essex and north Kent (Fig. 17.3). These are in MOLA fabric types 2455, 2454 and 3022, samples of which are held in a long-established fabric reference collection held by MOLA (Museum of

London Archaeology).

Comparison with early Roman pottery suggests these buff-coloured tiles were made in north Kent, probably at an estate tileworks operated by the Eccles villa. The villa was certainly producing tiles in the late 2nd century as a kiln of this date has been found 450m to the south-west of the villa complex (McWhirr 1979, 158), but the tiles brought into London are from an earlier phase of production dating to around AD 50–80/100.

The distribution map of tiles in fabric 2454 clearly shows the importance of coastal and river transport for movement of heavy goods such as tiles. The movement of tiles from the Eccles area may have been connected with the exploitation of Kentish ragstone from quarries in the Maidstone area, a stone type widely used in Roman London. The well-known Blackfriars barge, a cargo ship wrecked in the late 2nd century, had a cargo of Kentish ragstone from quarries in the Maidstone area (Marsden 1980, 127).



Fig. 17.3: Distribution of the yellow, cream, white and pink tiles believed to have been made in the Eccles area (fabrics 2454, 2455, 3022). (Drawn by Judit Peresztegi, ©MOLA).

Kentish ragstone was shipped into London as there are no naturally occurring building stones in the London area. It is more difficult to explain why tiles were also brought in if there were local kilns already in operation. It is possible that in the fast expanding 1st-century city

the local kilns had insufficient capacity to meet demand. It has also been suggested that they could have been used with the locally-made red tile to create patterned roofs. It is even possible that they may be a sign of social status. In Beirut, Lebanon in the Early Hellenistic/Ptolemaic Period important public buildings were picked out in yellow tiles whilst the rest of the city was roofed in red tiles (P. Mills, pers. comm). However, there does not seem to be any concentration of buff-coloured tiles on the site of London's public buildings.

Another group of tiles, although far rarer in London, also seem to have their origin in north Kent ([Fig. 17.4](#)). These are red in colour and are often characterised by distinctive coarse moulding-sand on their base and sides (MOLA fabric 3226). So far these tiles are only known from London, north Kent and one site in Essex. Provisional dating suggests they were brought into London around AD 70–100.

The majority of tile kilns supplying Roman London, and indeed most other major towns in Roman Britain, concentrated on the manufacture of roofing tile and brick, as these were the tile types most used in building construction. Many tileries also manufactured smaller quantities of other tile types such as box-flues, voussoirs and small *opus spicatum* paving bricks.

One tile-making centre was highly unusual in specialising in the production of large thick-walled box-flue and voussoir tiles. These red-coloured tiles were all made with the same distinctive sandy clay often containing varying numbers of voids where organic matter burnt out during firing (MOLA fabrics 3054). Some tiles (MOLA fabric 3059) have so many voids that there seems little doubt that what appears to be cereal chaff (A. Davis, pers. comm.) was deliberately added, perhaps in an attempt to reduce the quantity of clay needed for each tile.

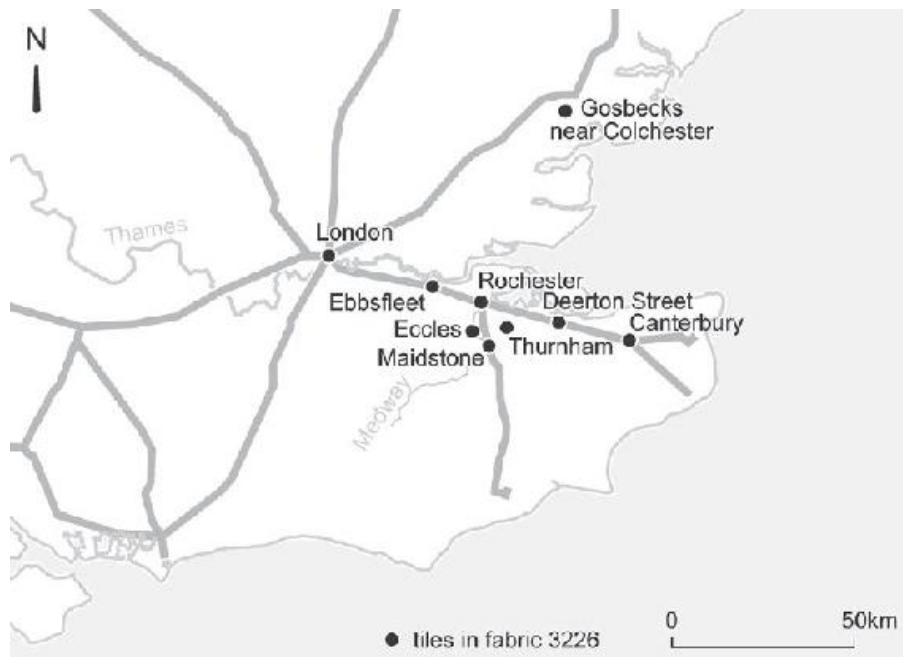


Fig. 17.4: Distribution of north Kent red tiles in fabric 3226 (drawn by Judit Peresztegi, ©Museum of London Archaeology).

The location of the tilery producing these tiles, which in London are dated to around AD 70–100, is unknown but their distribution suggests it could have been somewhere along the south coast, perhaps in the Chichester area (Fig. 17.5).

The voussoir tiles are of a particularly unusual type, having large semi-circular cutaways near the base of the front and back faces (Fig. 17.6). Recent work suggests the voussoir tile was a technological innovation unique to Roman Britain, one that only rarely left its home territory (Lancaster 2012, 437). The development of the hollow voussoir was an important technical achievement as it lowered the weight of vaulted roofs. The use of hollow voussoirs spread throughout Britain in the 2nd century, although in London these were of a different form: thinner with circular vents in the centre of the front and back faces.

The hollow voussoir was not the only innovation of the ‘Sussex’ tile-makers, they also made double-box flues with two parallel air vents and began the production of hollow curved brick. These massive thick-curved bricks, one London example being 571mm long and another over 576mm in length, were originally thought to be columns or engaged columns set against the side of a building with the outer relief-patterned keying acting as a base for the application of stucco or

plaster. The recent examples recovered from the Bloomberg site in London (BZY10) (Fig. 17.7), however, suggest they were actually used in hypocausts rather than as columns. The Bloomberg examples have the same sooted interiors as seen on the inside of box-flue tiles, and there is no evidence for the presence of mortared rubble infill which would have been needed if they were set upright as columns. It would seem most likely that they were set horizontally along the top of walls where they would have rested above lines of vertical box-flue tiles. Using this method heat from each line of flue tiles could have been directed to a central chimney or vent.

As with the tiles imported from north Kent by water, movement by boat may have been a key element in the distribution of the specialist products of the Sussex tile-makers. In other cases, such as the tiles used at the villa sites of Bignor and Wiggonholt, and at Alfoldean, transportation would have been by cart or waggon along the main Chichester to London road.

Any movement by road would have been difficult, particularly for the thick heavy box-flue and voussoirs made by the Sussex tile-makers. The massive curved bricks, which were also used at Wiggonholt, would have been particularly difficult to transport. This raises two issues. Firstly, why were such heavy tiles moved over such long distances rather than relying on more local sources of supply, and secondly why did the Sussex tile-makers specialise in the production of box-flue and voussoir tiles rather than the more common types such as roof tile? They did produce a few bricks, but again their output differs from most other tileries as half their output was of larger thicker brick types (59–100mm), probably *sesquipedalis* and *bipedalis*, rather than smaller *bessalis*, *pedalis* and *lydion* bricks (Brodrigg 1987, 3). These larger, thicker square bricks were made to cap pilae stacks in the floor of hypocaust heating systems.



Fig. 17.5: Distribution of tiles believed to have been made by Sussex tilemakers (fabrics 3054, 3059). (Drawn by Judit Peresztegi, ©MOLA).

An explanation for the wide distribution of the products of the Sussex tile-makers is that they do not just represent a trade in tiles but mark the presence of teams of tile-makers and builders who specialised in the construction of bath-houses and hypocaust heating systems on villa sites and in urban centres such as London and Chichester. Not only would the builders have brought along the skills needed to construct efficiently heated and adequately ventilated bath-buildings, they would have brought along the specialist tiles needed for the job.

Tiles were brought into London from a variety of other production sites during the 1st to mid-2nd century. It is not possible to examine each of these, but three will be briefly discussed. This period was marked by a massive programme of both public and private building construction. New roads were laid out; new riverside wharfs built and new buildings constructed (Perring 1991, 67, fig. 31; Milne 1995, 68–70). Many of the public buildings referred to earlier date from this period of expansion. Roofing tile becomes prevalent in the archaeological record, suggesting tiled roofs had now become the norm, even on more humble clay and timber buildings. Building regulations may have prevented the use of inflammable material such as thatch or wooden shingles.

Dating to this period of growth are a number of tiles made from fine slightly sandy clay with occasional cream silty inclusions (MOLA fabric 3069). They vary in colour from light brown, light grey, orange and cream through to red. The distribution of relief-patterned box-flue tiles (keyed with dies 2 and 11) made in this sandy slightly silty clay (Betts *et al.* 1994, 20–1) form a discrete circular cluster in the

Hertfordshire/Buckinghamshire border (Fig. 17.8). It seems reasonable to suggest that the source tilery lies somewhere near the centre of this cluster. This tilery seems to have been in operation in the late 1st century, although the dating is not secure.

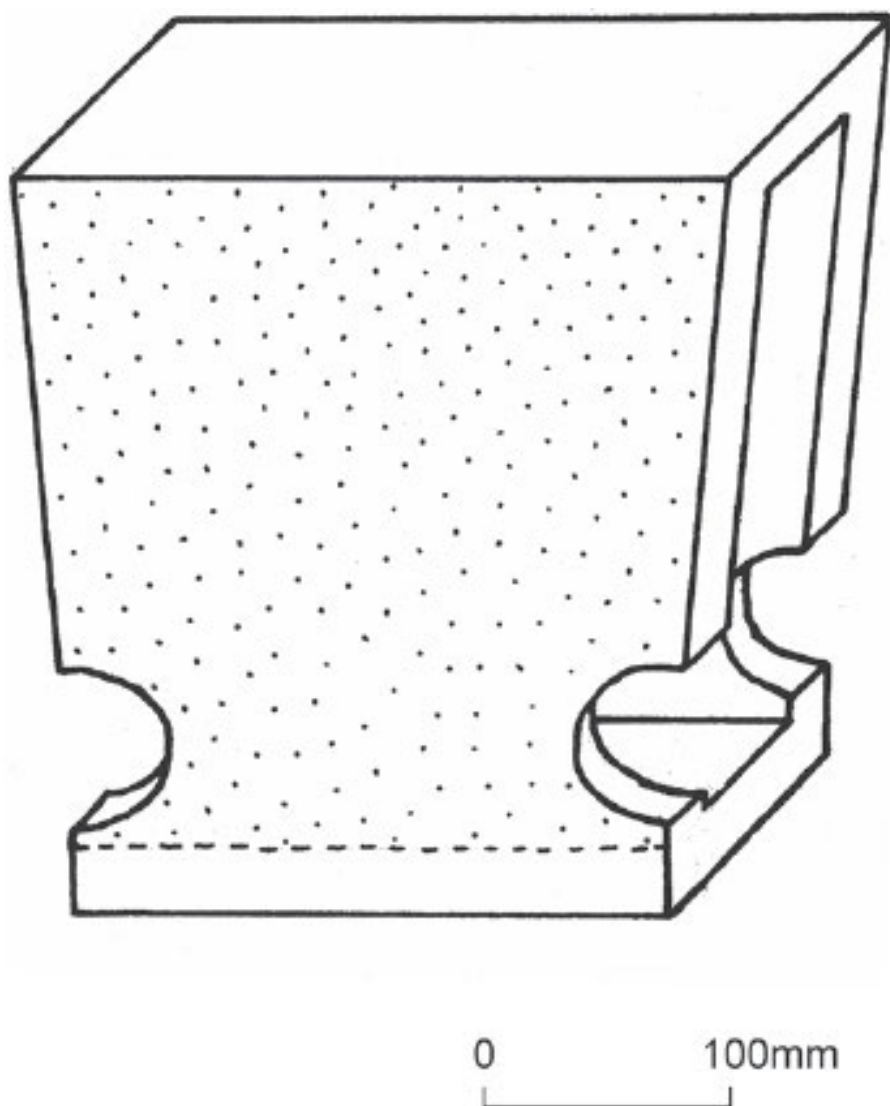


Fig. 17.6: Voussoir tile believed to have been made by the Sussex tilers (drawn by Ian Betts, ©MOLA).



Fig. 17.7: Large relief-patterned curved brick from Bloomberg, London (approx. scale 1:8). (Photograph: Andy Chopping, ©MOLA).

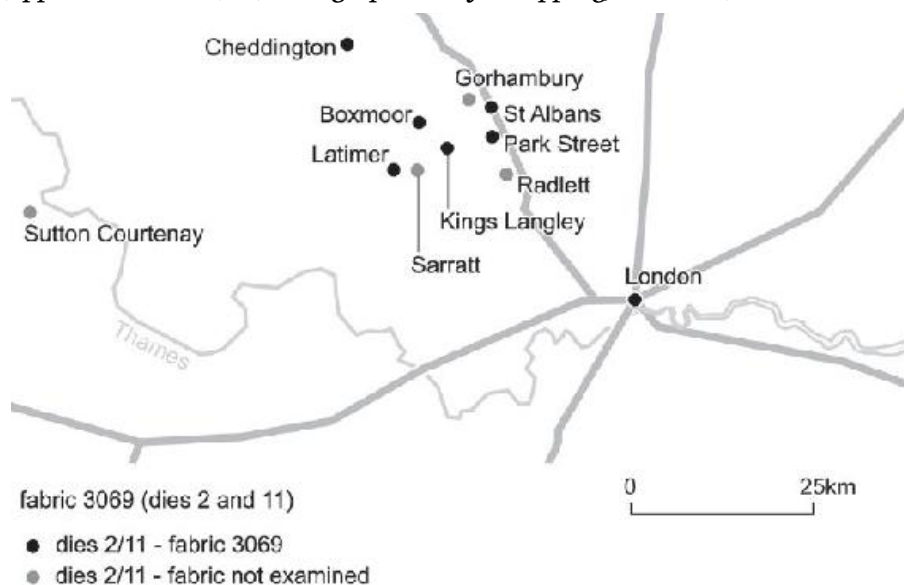


Fig. 17.8: Distribution of sandy and silty tiles in fabric 3069 (drawn by Judit Peresztegi, ©MOLA).

Another source of London tiles may lie further to the west. There are a small number of reddish-orange tiles with distinctive cream silty lumps - perhaps added 'grog' (MOLA fabric 3018). These are similar to certain tiles made at the Braxell's Farm kiln near Botley in Hampshire, examined by the author. Again these tiles are not well dated but would appear to be early 2nd century.

Roofing tile, box-flue and brick characterised by very small black iron oxide inclusions in a fairly sandy clay matrix (MOLA fabric 3023, 3060) are common on many Roman sites in London. These are

believed to have come from a tile kiln at Harper Lane, Radlett in Hertfordshire (Stephen Castle, pers. comm). They date to the late 1st to early 2nd century.

Later tile production

The mid-2nd century seems to have marked a major change in the supply of brick and tile for use in Roman London. Many local tile kilns which formerly supplied London seem to have fallen out of use and new sources of supply become evident. This change coincided with many local pottery kilns ceasing production. The Northgate kilns fell out of use around AD 160 (Seeley and Drummond-Murray 2005, 75) and the Highgate pottery industry folded around the same period (Davies *et al.* 1994, 82). Tile production also ceased in other areas of the South-East during the same period. For example, the tileries located near to Canterbury, Kent appear to have fallen out of use sometime in the 2nd century (McWhirr 1979, 154–5).

The picture is far from complete but there appears to have been a change away from tileries situated in or near towns supplying a limited local market to more rural tileries supplying tiles over a wider geographical area. In London this may reflect a downturn in demand as by the mid-2nd century the majority of public buildings had now been constructed. It has also been suggested that the population density was falling in the mid- to late 2nd century, which in turn manifested itself as a drop in the demand for new housing or the expansion of existing buildings (Swain and Williams 2008, 39).

This change coincided with the increased reuse of brick obtained from the demolition of existing buildings. Shortly after c. AD 140 Huggin Hill bath was systematically stripped of its box-flue tiles, roofing tiles and other salvageable items when it was deliberately demolished (Bateman 1998, 48). This one building alone would have released an enormous quantity of building material for reuse. Likewise, the basilica, a large public building demolished at the beginning of the 4th century (Bateman 1998, 51), would have provided ample building material for reuse.

It is possible that tile production may have temporarily restarted sometime around AD 190–220 (Milne 1995, 77). This is the probable date of the 3km long Roman city wall which although constructed of Kentish ragstone used considerable numbers of tiles set in horizontal string courses. It seems unlikely there would have been sufficient reusable material for such a vast building project. Large quantities of

tile would also have been required for construction of the riverside wall built in AD 255–270 (Perring 1991, 107).

If production did restart, some new material may have been used in the more widely-spaced privately-owned masonry urban villas which replaced the densely packed clay and timber buildings so characteristic of early Roman London. Various types of tile and brick were used in the construction of these urban villas, such as the example found at Arthur Street (AUT01) with its fine mosaic floor (Swift 2008, 43–4), and the 3rd-century building at Lothbury (LHY88) with its hypocaust floor (Hill and Rowsome 2011, 231–4).

Fresh sources of supply were, however, still needed, particularly of box-flue tile, where there was only a limited number available for potential reuse, and roofing tile. Even if production had restarted in the late 2nd to early 3rd century, this would have been for the production of rectangular *lydion* bonding bricks (Brodrribb 1987, 3) needed for the city's defensive wall.

The most common new import after the Hadrianic Fire of c. AD 120–125 is a series of fine sandy red tiles which are easily identified by the presence of very fine moulding sand attached to their base and sides (MOLA fabric 2459B). These may have been made at a tilery located to the north-east of London or in south Essex where there are similar clays (Betts 2006). Tiles from the same tilery, which are dated to around AD 120–250, are also known from north Kent and Essex.

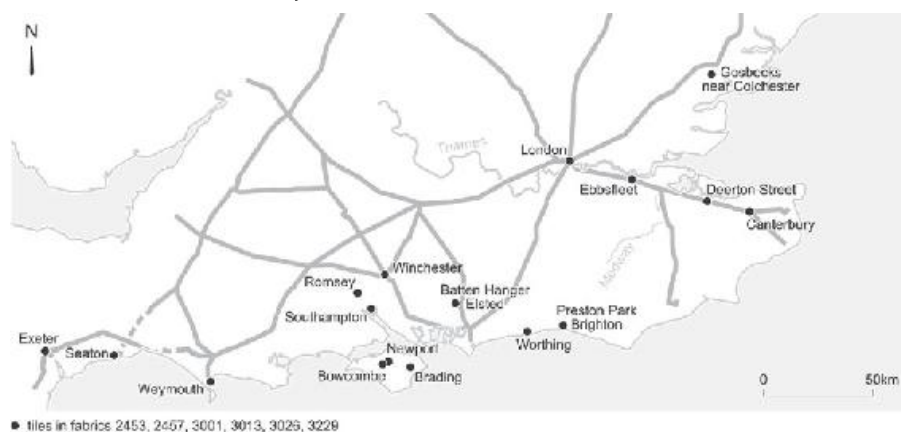


Fig. 17.9: Distribution of calcareous tiles (fabrics 2453, 2457, 3001, 3013, 3026, 3229). (Drawn by Judit Peresztegi, ©MOLA).

A series of roofing tiles made from distinctive cream, white, grey, pink and pale yellow fired calcareous clays (MOLA fabrics 2453, 2457, 3001, 3013, 3026, 3229) first appears in London around AD 140. Their use would seem to have continued well into the 3rd century

(Betts and Foot 1994, 31–2). Calcareous tiles have an exceptionally wide geographical distribution across southern England (Fig. 17.9). Many are on sites located on or near the coast or are situated on navigable rivers implying movement of tiles by ship and boat. The location of the tilery producing these tiles is still unknown.

An interesting feature of the calcareous group is that something like 98 per cent is roofing tile, the remaining 2 per cent being brick, combed box-flue and *tegula mammata*. This is probably because earlier roofing tiles could not easily be reused as they were both larger in size and heavier. Mixing tiles of different size and weight would have made the roof unstable. Flanges were sometimes therefore deliberately knocked off earlier tiles so that the resulting flat tile could be reused as walling.

Brick size on the other hand stayed the same so bricks could be more readily reused. Even in decayed and derelict buildings the bricks would have survived intact in the walls, whilst any surviving roofing tile would often have fallen and shattered.

One later production source can be pinned down with slightly more accuracy. This produced the *Classis Britannica* tiles (MOLA fabric 3200) made by the Roman navy between c. AD 130 and 210 (Crowley and Betts 1992, 222). The majority seem to have been produced using Fairlight Clay which outcrops a little to the east of Hastings (Peacock 1977, 242) (Fig. 17.10).

There are currently only four *Classis Britannica* stamped tiles known from London (Crowley and Betts 1992, 218–22; Taylor-Wilson 2002, 29) together with a small quantity of unstamped tile. It is still unclear why these tiles were brought into London. Milne (1995, 115) has suggested that they may indicate an office of the *Classis Britannica* in London attached to the provincial governor's staff. Another alternative is that they may have come in as ships' ballast.

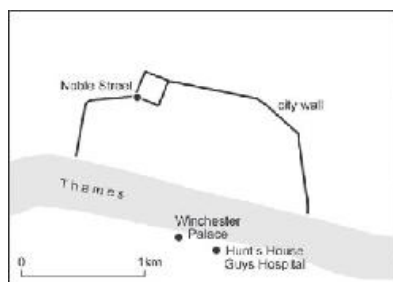


Fig. 17.10: Distribution of Classis Britannica stamped tiles, with inset showing distribution in London (drawn by Judit Peresztegi, ©MOLA).

Another important later Roman tile group is characterised by small dark red and black inclusions, probably a type of quartz (MOLA fabrics 3050, 3061). At least some of these tiles were made at Doods Farm, Reigate in Surrey (Betts 2003, 256–7). Roller-stamped tiles in the same fabric were used in a tile kiln found at Rosehill, Reigate in 2004. Interestingly the archaeomagnetic date for the last firing (AD 90–120) is rather at odds with the associated pottery which has been dated to the second half of the 2nd century (Howe *et al.* 2005, 280). The pottery is certainly more in agreement with the suggested AD 140–230 date for the use of Reigate tiles in London. Alternatively, the tiles used in London may represent a later phase of tile production at Reigate. Many tiles believed to have been made at Reigate were found associated with the Billingsgate bath-house and the attached suburban villa (BBH87) whose construction is provisionally dated to the early 3rd century (Perring 1991, 100, 418; Keily and Betts 1993).

The latest tiles which we can say with confidence were imported into London were made at a tilery at Harrold, Bedfordshire. These were produced using distinctive shelly clay (MOLA fabric 2456) which often fired to a brown or creamy colour with a grey or black core. Tiles from Harrold are widespread in the south Midlands, Cambridgeshire and are also found in Essex and Kent (Unger 2009, 109; [Fig. 17.11](#)). Shelly Harrold tiles seem to have been brought into London during the late 3rd to mid-4th century, possibly because fresh supplies of calcareous tiles were no longer available. Most of the Harrold products arriving in the city were roofing tiles or combed box-flues. There are some bricks but these are few in number, probably because of the widespread practice during this period of reusing brick from the demolition of existing structures.

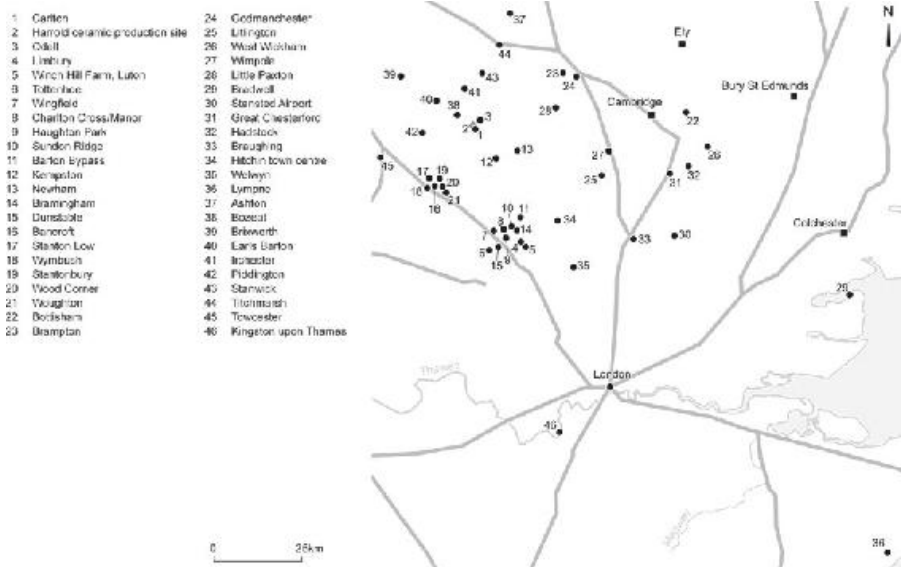


Fig. 17.11: Distribution of shelly tiles from Harrold, Bedfordshire (fabric 2456). (Drawn by Judit Peresztegi, ©MOLA).

Switch to building stone

Production at the Harrold tiler is believed to have ceased around AD 350. It is significant that there is a sudden increase in the use of fine sandstone and fine-grained laminated limestone as both roofing and paving at this date. Both were found associated with a major stone building constructed after AD 350 in the south-east corner of the city (Pepys Street/Cooper's Row, PEP89; Sankey 1998, 78). This switch to stone strongly suggests there were no readily available supplies of ceramic tile available by the mid-4th century. Where tiles were needed they had to be reused, as in a late 4th-century masonry building at Pudding Lane (PDN81) which reused 1st- to early 2nd-century procuratorial stamped bricks (Milne 1995, 86–7; Betts 1995, 220).

The switch to stone was believed to mark the end of the ceramic building material importation into London. This changed with the discovery of a tile kiln under St Martin-in-the-Fields church at Trafalgar Square (SMD01) in 2001 which produced an archaeomagnetic date for the last firing of AD 400–450 (Telfer 2010, 53). This suggests that after a gap of some 50 years, fresh supplies of new ceramic building material were needed for building construction or repair sometime at the very end of the 4th or early years of the 5th century. Of course those who constructed the kiln would have been unaware that their intended market would soon collapse with the

virtual abandonment of the Roman London in the early 5th century.

Discussion

It is clear from the archaeological record that there was a profound change in the origin of the Roman tile used in London around the mid-2nd century. Up until this date most tile was obtained from tileries situated in or near to London, supplemented by tiles from more distant sources, in particular north Kent. Around the mid-2nd century these more local tileries seem to have fallen out of use to be replaced by more rural tileries situated well outside the London area. Many of these, particularly those supplying calcareous- and shelly-fabric tiles, distributed their products over a wide geographical area. This may have been the result of a more general fall in demand in south-east England for new tile from the mid-2nd century onwards. Whatever the exact cause, it would now appear to have become more economical to supply tiles from various regional hubs rather than a larger number of more local tileries.

Around the mid-4th century stone roofing and stone paving replaced the use of ceramic tile, at least until local production restarted at the very end of the Roman occupation.

The picture of Roman tile use in London, even after over 30 years' study is still incomplete. The production source of many rarer imports into London is still unknown, for example the tiles with distinctive shelly moulding-sand (MOLA fabric 3024), or the yellow and pinkish-orange tiles with prominent red spots (MOLA fabric 3005). It is quite likely some were made a considerable distance from London. Recently a small group of sandy tiles (MOLA fabric 2458) were found to have a probable Devon or Cornwall origin based on their petrology (Williams 2013). What is clear that the manufacture and distribution of Roman tile is much more complex than was originally believed only a few years ago.

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